THE IRON TRADE REVIEW

VOLUME XXXVI CLEVELAND, OHIO, MARCH 12, 1903 NUMBER 11

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Buying of Lake Superior ores for 1903 began with this week, but too little time has elapsed since the announcement of prices for any estimate as to the attitude of furnacemen toward the advance of from 25 to 35 cents on old-range ores and of about 75 cents on Mesabi ores. Some contracts have been made but there is no rush and probably will not be until the pig iron market takes a start. In Bessemer pig iron, while some recent statements concerning negotiations by the United States Steel Corporation have not been borne out, it is known that the corporation and several other large steel companies are ready to buy for the second half, but there are differences between buyer and seller as to the price. There is some surprise at the small amount of Bessemer iron for sale for the second half, the Bessemer furnaces having less than 150,000 tons to offer for such delivery, while it is believed the demand from leading steel companies is for more than 250,000 tons. Present offers are in the neighborhood of $20 at furnace and the asking price about $21. The effort of foundry buyers to break the pig iron market by waiting continues. There is some irregularity in prices on iron available for the first half of the year, but in respect to the second half the unwillingness of sellers to make concessions could scarcely be more pronounced if there were concerted action. Here and there a large buyer has provided for his requirements, but such cases are the exception. Forge iron has been quoted lower by some Southern makers, but there is no considerable buying, though it is known that large requirements in the second half are yet to be provided for. Sellers have quoted as low as $15.75 Birmingham, but even $15.50 on round lots does not bring business. At Pittsburg a sale of 4,500 tons of gray forge, delivery in the next three months, is reported at $21. Basic iron for early delivery is scarce and importations for the second quarter are probable. For the second half quotations are $20 to $20.50 Central Western furnace. German foundry iron has sold rather freely in the East, sales of more than 10,000 tons for the week being reported at New York at $20.50 to $21. Steel is inactive, both foreign and domestic, and indications point to a lessening of imports. The outlook for spring activity in finished iron and steel is excellent, and a strong and active market is in evidence in several lines. The strike of structural workers is a drawback and there are some signs that labor demands in other directions may prove a disturbing factor. The American Bridge Co. closed 7,000 tons of new work, chiefly for railroads, at New York last week. Plate mills, in spite of additions to capacity, are evidently taking on more tonnage than is being shipped out, and those of the steel corporation are filled for seven or eight months. Other mills are now asking 1.75c or $3 a ton above the agreed price. Sheets have shown marked improvement in all markets, chiefly on heavier gauges. The bar iron market is generally stronger and one producer has advanced to 1.85c Youngstown. Yet sales $1 and $2 a ton below this are reported. The consolidation project of Western mills still hangs fire but has not been officially called off.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, March 11.

The United States Steel Corporation and other large interests are ready to buy a total of fully 250,000 tons of Bessemer iron for deliveries running through the second half of the year, while one interest is willing to buy through the first half of next year, provided a satisfactory price is named. The amount of iron offered the steel corporation falls more than 60,000 tons short of its requirements, while the other large interests now negotiating are unable to secure quotations on all the iron they desire. Within the past few days furnace operators in the Mahoning and Shenango Valleys have stiffened prices considerably for second half deliveries of Bessemer iron and most of the furnaces are asking from $20.50 to $21 per ton at the stack. While the large consumers now in the market have been prepared to pay $20 for this delivery it is doubtful whether they are willing to meet the increased price. These large contracts may be delayed, therefore, for some time. The furnacemen justify their position by the high price of coke and the higher prices for their ores, apart from the losses they have sustained due to the banking of their furnaces during the past six months. For the first half of next year some are asking $19.50 at the furnace, while the others absolutely refuse to consider $19 a ton, which has been offered them.

The season's ore prices were finally announced on Monday and they do not differ in any respect from those heretofore given in these columns. Old range Bessemers sell on a basis of $4.50 at lower lake ports, and Mesabi Bessemers at $4. Old Range non-Bessemers are based on $3.60 and Mesabi non-Bessemers on $3.20. The prices on Bessemers are based on an ore containing 63 percent of iron, 10 percent of moisture and .045 percent of phosphorus, while the non-Bessemers are based on an ore containing 60 percent of iron and 12 percent of moisture. Very little ore has been sold to interests in this city thus far, and as buyers not controlling their own ore mines have heretofore bought largely of Mesabis it will be some time before they place their orders, in view of the higher prices asked for Mesabi ore this year. Among the ore prices quoted here this week we note the following: Vermillion, non-Bessemer, $4.09; Salisbury, $3.58; and of Mesabi ores—Longyear, $3.27; Morrow, $3.28; Pearce, $3.94.

The withdrawal within the next ten days of thirty or thirty-five locomotives from service in this district will again result in a slower movement of freight, inasmuch as the locomotives loaned to the roads entering this district at the close of the navigation season last November by railroads in the Lake Superior ore region and by the Bessemer & Lake Erie Railroad are to be returned owing to the opening up of mining operations and the shipment of ore. Although a number of new locomotives have been added to the railroad equipment in this district during the past few months, there is not yet sufficient motive power to take care of freight from this territory

and the withdrawal of these locomotives will be sadly felt.

In finished lines the market is in strength and activity. Both steel and iron bars are unusually active, fully 5,000 tons of the latter having been sold during the week. One large bar iron interest has advanced the price $1 per ton to 1.85c, Youngstown, equivalent to 1.89¼c, Pittsburg. The tin plate market is also unusually active, while the first week of the month for the pipe and tube manufacturers was equal to any week in February, which was a record breaker in tonnage. With the Carnegie Steel Co. practically sold up on plates for the next seven or eight months, other local producers have advanced the price for prompt delivery $3 per ton. The tin plate plant at Sharon, Pa., this week commenced rolling tin plate from Bessemer bars instead of open-hearth, which had been the practice since this mill was put in operation. This change will give the steel corporation a larger tonnage of available open-hearth stock which it has been in need of, and it is also claimed that Bessemer bars can be converted more economically than open-hearth.

Pig Iron.—A considerable range of prices continue to be quoted on foundry irons for delivery the second half of the year. Most of the Valley furnaces are asking $21, or $21.85, Pittsburg, for No. 2. Western Pennsylvania furnaces shipping iron into this district, on the other hand, are asking from $21.50 to $22, Pittsburg, while one local furnace, which always secures from 50c to $1 above the prevailing market prices owing to the special grading of its product, is quoting $22, Pittsburg. There has been some buying, but large consumers are still waiting. For prompt delivery, from $22.50 to $23 is quoted, and we note the sale of 500 tons for immediate shipment at the lower figure. We also report the sale of 4,500 tons of forge for delivery during the next three months at $21, Pittsburg. Northern basic for delivery during the remainder of the first half is not to be had, while for delivery during the second half of the year $20.50 at the furnace is asked. Foreign basic can be laid down in this market at $21.75 and it is probable that considerable will be purchased during the next three months. We quote as follows:

Bessemer, Valley	$21 50 to 22 00
Bessemer, Pittsburg	22 35 to 22 85
No. 1 Foundry	23 50 to 24 00
No. 2 Foundry	22 50 to 23 00
Gray Forge, Pittsburg	20 75 to 21 00
Chilled Basic, Valley	21 00 to 21 25
Chilled Basic, Pittsburg	21 85 to 22 10

Steel.—Small lots of open-hearth steel for prompt shipment continue to be sold at prices ranging from $31 to $33, according to the analysis. Bessemer billets are held nominally at $30.50, at mill, Pittsburg. Bessemer rods are extremely firm and are quoted at $36, while open-hearth are held at $37.

Ferro-Manganese.—Domestic ferro has again been withdrawn from the market and sales continue to be limited to the English product, which is held at $52.50 in carload lots delivered at buyer's mill, while less than carload lots are quoted at $55.

Spelter.—Prices have again advanced and prime Western grades are held at 5.10c to 5.12½c, Pittsburg, in large lots.

Muck Bar.—We note the sale of 500 tons of neutral muck bar at $35, Pittsburg. Large consumers are now in the market and it is probable that considerable business will be placed, although some large producing interests are holding out for $36.

Skelp.—We note the sale of 1,500 tons of steel skelp for delivery the remainder of the first half at 1.92½c. Iron skelp, grooved and sheared, is quoted at 2c to 2.05c.

Rails and Track Material.—Further new business was placed during the week in standard sections, and the demand for light rails is improving. Splice bars to accompany large rail orders are held at 1.60c, although for small lots as high as 2c to 2.10c is quoted. We make the following quotations: Standard sections, 50 pounds and over, in lots of 200 tons and over, $28; car lots and less than 200 tons, $30; less than car lots, $32; light rails, 16 pounds and 20 pounds, $36; 25 to 40 pounds, $34.50 to $35. Track materials: Spikes, 2.15c to 2.25c; track bolts, square heads, 2.05c; hexagon heads, 2.65c; fish plates, 1.60c.

Plates.—Tank plates for early delivery have been advanced $1 per ton and are now quoted at 1.75c, Pittsburg. The demand for plates is extraordinary and most of the mills have business booked for the next six months. We quote as follows on large orders for future delivery: Tank plates, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.75c; marine, ordinary, fire-box, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive fire-box, not less than 2.10c, and it ranges in price to 3c. Plate more than 100 inches, 5c extra 100 pounds. Plate 3-16 of an inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5c extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

Bars.—Large iron bar manufacturing interests have again advanced the price $1 per ton and they are now held at 1.89¼c, Pittsburg, though sales have been made at lower prices. Orders for fully 5,000 tons for delivery the remainder of the first half have been placed during the week. Steel bars are strong, both jobbers and consumers having bought heavily in recent weeks. We quote as follows: Bessemer steel bars, 1.60c; open-hearth, 1.70c; plow beams and cultivator beams, 1.60c, net; channels, angles, zees and tees, Bessemer under 3 inches, 1.70c; over 3 inches, 1.80c; bar iron, 1.80c to 1.85c, Youngstown, or 1.84¼c to 1.89¼c, Pittsburg, with freight added to point of delivery from Youngstown. Hoops and bands are quoted at 1.90c, full extras, in 250-ton lots and over, and 2c in less than 250-ton lots.

Structural Material.—Another large office building is to be erected in this city during the coming summer which will require fully 5,000 tons of material. The strike of the structural workers on all the construction of the American Bridge company has brought much work in this district to a standstill. The outlook for the year is not very encouraging for the large structural interests, as higher wages for their employes and trouble unless they are granted are to be potent factors within a few months. We quote: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles from 3 to 16 inches, 1.60c; universal mill plates, 1.60c.

Pipes and Tubes.—Demand continues heavy and the mills of the largest producer are operating in full to supply the immense demand. Prices on carload lots, plus the freight to destination, are as follows:

MERCHANT PIPE.

	Steel		Guaranteed Wrought Iron	
	Black Percent.	Galv. Percent.	Black Percent.	Galv. Percent.
⅛, ¼ and ⅜ inch	68	58	65	55
½ inch	70	60	67	57
¾ to 6 inch	75	65	72	62
7 to 12 inch	73	63	70	60
Plugged and Reamed				
1 to 4 inch	73	63	70	60
Cut 3 to 6 feet				
⅛, ¼ and ⅜ inch	63	52	60	49
½ inch	65	54	62	51
¾ to 6 inch	71	60	68	57
7 to 12 inch	69	57	65	54
Cut 6 feet and longer				
⅛, ¼ and ⅜ inch	64	53	61	50
½ inch	66	55	63	52
¾ to 6 inch	72	61	69	58
7 to 12 inch	70	58	66	55
Extra Strong Plain End				
⅛ to 8 inch	69	59	65	55

Threads only—Same as Plain End, plus 1¼ percent net.
Threads and Couplings—Same as Plain End, plus 2½ percent net.

Double Extra Strong Plain End				
⅛ to 8 inch	61	51	57	47

Threads only—Same as Plain End, plus 2 percent net.
Threads and Couplings—Same as Plain End, plus 3 percent net.

Note: Orders for less than carload will be charged at 12½ percent advance. Extra and Double Extra Strong Cut Lengths, lower random discounts by 10 percent net for 6 feet and longer, and 15 percent net for 3 to 6 feet.

BOILER TUBES.

Steel.

	Percent
1 to 1¼ inches	45
2¼ to 5 inches	62½
1¾ to 2¼ and 6 to 13 inches	52½

Iron.

	Percent.
1 to 1¼ inches	36½
2¼ to 5 inches	45½
1¾ to 2¼ and 6 to 13 inches	35½

CASING.

	S. and S. Percent.
2 to 3 inches	58
3¼ to 4 inches	60
4¼ to 12½ inches	63

Sheets.—The situation in black sheets continues to strengthen and more mills are being placed in operation daily. The market is also stronger and concessions are not being made by the American Sheet Steel Co. or by independent

manufacturers in the way that has been common for some time. Our quotations are as follows: No. 28, 2.75c; No. 27, 2.65c; No. 26, 2.55c; Nos. 22 and 24, 2.45c; Nos. 18 and 20, 2.35c; Nos. 14 and 16, 2.25c; Nos. 10 and 12, 2.10c to 2.15c. Galvanized: No. 16, 2.60c; No. 18, 2.85c; No. 26, 3.35c; No. 27, 3.60c; No. 28, 3.85c; No. 29, 4.35c; No. 30, 4.50c.

Wire and Wire Nails.—One of the large local independent interests has advanced prices on wire nails $1 per ton, although the American Steel & Wire Co. has not followed the advance. The demand for all kinds of wire products continues good and the market is firm. We make the following quotations: Wire nails, carload lots, to jobbers f. o. b. cars, Pittsburg, $2.00; plain wire, carload lots, $1.90; barb wire, carload lots, $2.30; staples, carload lots, $2.20. Galvanizing, 30 cents extra. Carload lots to retailers are held at 5 cents advance in all lines, and on less than carload lots a further advance of 10 cents is charged. Steel cut nails are quoted as follows: Carload lots, $2.10, and less than carload lots, $2.15 f. o. b. Pittsburg, plus freight to point of destination. Iron cut nails are $2.20 in carload lots and $2.25 in less than carload lots. Terms, 60 days, less 2 percent off in 10 days.

Merchant Steel.—The demand for shafting continues excellent and prices are being firmly maintained. We quote as follows: Turned cold rolled and ground shafting, 47 off in carload lots and 42 percent off in less than carload lots; tire steel, 2.15c to 2.25c; spring steel, 2.25c to 2.35c; toe calk, 2.30c to 2.40c. The following differentials maintain: Less than 2,000 pounds of a size and not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance. Tool steel is quoted 7 cents and upwards, according to the grade.

Old Material.—The market continues firm in all lines. Cast scrap is in big demand for foundry purposes, while heavy melting stock continues to rule strong and high. Our quotations, gross tons, are as follows: Heavy melting stock, $21 to $21.50; low phosphorus melting stock, $25 to $25.50; steel rails, $21 to $21.25; re-rolling rails, $22.50 to $23; No. 1 cast scrap, $20.50 to $21; borings, $11 to $11.50; busheling scrap, $17.50 to $18.50; old iron rails, $24.50 to $25; turnings, $15 to $15.50.

Coke.—There is no change in the general situation. High prices continue to rule for early shipments. Foundry coke is held at prices ranging from $6.50 to $7, while furnace coke is quoted at $5.50 to $6. For the week ending Saturday, Feb. 28, the production of the upper region amounted to 242,125 tons, and that of the lower region 50,075 tons. During the week 100 new ovens were fired in the region.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
519 MONADNOCK BLOCK, March 10.

The principal feature of the week's trading is the heavy demand for rails, inquiries and orders pending aggregating 60,000 tons. Standard sections form the bulk of this tonnage, and deliveries are asked for this year. Track supplies have also been active in sympathy with the rail market, the leading producer reporting that its capacity on bolts for the year has been taken up. A brisk demand for sheets has set in, and some outside mills have advanced their prices. Pipes and tubes are without change, though shipments of material are considerably delayed owing to the scarcity of cars and the congestion of traffic between this city and Pittsburg. This condition of affairs is also responsible for the idleness of the wire mills at Joliet belonging to the American Steel and Wire Co., which were shut down again yesterday because of the failure of the coke supply. The DeKalb and Waukegan plants are also in a precarious condition, though special efforts are being put forth to keep these in operation. New business in plates is not of large proportions, for the reason that the chief producers have sold practically their entire capacity for the year. Firmness marks the bar iron market, and while the demand has fallen off slightly specifications on old contracts are plentiful and full quotas are asked for. The pig iron market is without change, buying being limited to small lots for quick delivery. The scrap market has improved under increased demand.

Pig Iron.—There is little animation in the local pig iron market, and such inquiries as are received are all for iron for quick shipment. The total tonnage sold in this city during the week under review would not exceed 5,000 tons, divided among a large number of consumers in lots of 25 to 300 tons. Southern furnaces have done most of the selling, the sales including charcoal iron, malleable Bessemer, silvery irons and foundry grades. The buying comes from foundries on all kinds of work. There are some good sized orders for gray forge, basic and malleable Bessemer still pending, but the chances of these being placed in the near future are somewhat remote. No interest is shown in deliveries for the last half, and from present indications melters seem determined to wait until the last moment in the hope of a lower market before covering for their needs for this period. Notwithstanding this practical suspension of buying operations the market has a firm tone, and some furnaces are now asking $18.25 Birmingham for No. 2 foundry for the last six months of the year. The coke and car situation shows no improvement, and a number of foundries have had to shut down one or two days owing to their inability to get supplies of either pig iron or coke. We quote as follows, the maximum price being for deliveries prior to July 1.

Lake Superior Charcoal	$26 50 to 27 50
Local Coke Foundry No. 1	23 50 to 24 50
Local Coke Foundry No. 2	23 00 to 24 00
Local Coke Foundry No. 3	23 50 to 23 50
Local Scotch Foundry No. 1	24 00 to 24 50
Southern Coke No. 1	22 85 to 23 85
Southern Coke No. 2	22 85 to 22 85
Southern Coke No. 3	21 85 to 22 85
Southern Coke No. 4	21 85 to 21 85
Southern No. 1, soft	22 85 to 23 85
Southern No. 2 soft	22 85 to 22 85
Southern Gray Forge	21 85 to 21 85
Southern Silveries (according to silicon)	26 15 to 27 15
Jackson Co. Silveries, 6 to 8 percent silicon	31 30 to 32 30
Ohio Strong Softeners	26 30 to 26 80
Alabama and Georgia Car Wheel	27 35 to 28 35
Malleable Bessemer	23 00 to 24 00
Standard Bessemer	23 30 to 24 30
Basic Iron	22 35 to 22 85

Bars.— Contracts for iron are not being placed with quite the freedom that prevailed several weeks ago; nevertheless, a good business is being done. The most promising feature of the situation is the numerous orders for small lots for quick shipment, indicating that stocks in the warehouses of consumers are low. The movement in steel bars is good, buying being of liberal proportions. Hoops and angles are also active. We quote as follows, mill shipment, Chicago delivery: Bessemer steel, 1.76½c; angles, less than 3x3, 1.86½c base; hoops, in lots of 250 tons and greater, 2.06½c; less than this amount, 2.16½c; iron, 1.86½c to 1.91½c. Store prices are as follows: Steel, 2c to 2.10c; iron, 2.15c to 2.20c; hoops, 2.40c to 2.50c; angles, 2.25c rates.

Sheets.—The recent advances made by independent mills and jobbers have stimulated active buying for both black and galvanized. Last week, the sales of one large dealer exceeded the total sales of any previous week in this year, while the business done in February was greater than for several months past. The demand covers all gauges, but principally the heavier ones. We quote mill shipments, carload lots, Chicago delivery: Black sheets, No. 27, 2.91½c; No. 28, 3.01½c. Galvanized, No. 27, 3.61½c; No. 28, 3.81½c. On lots from store, we quote: Black, No. 27, 3c to 3.10c; No. 28, 3.10c to 3.20c. Galvanized, 75 and 5 percent.

Structural Steel.—A good business in lots from 1,000 to 100 tons has been done by mills, no large contracts having been placed. We quote mill prices, Chicago delivery: Beams and channels, 15 inches and under, 1.75c to 2c; 18 inches and over, 1.85c to 2.10c; universal plates, 1.75c to 1.95c; angles, 3x3 and larger, 1.75c to 1.95c; tees, 3x3 and larger, 1.80c to 1.90c; zees, 1.75c to 1.95c. The maximum quotation is asked by some mills on lots for quick delivery. Material from store, cut to length, 2¼c to 2½c per pound.

Plates.—The local mill has sold its capacity for practically the entire year, and during the past week has had to turn away much business. The bulk of this goes to jobbers, who have advanced their prices. We quote mill shipments, Chicago delivery, as follows: Tank steel, 1.75c to 1.95c; flange steel, 1.85c to 1.95c base. Prices for small lots from stock, tank steel ¼-inch and heavier, 2.15c to 2.25c; 3-16, 2.25c to 2.35c; No. 8, 2.30c to 2.40c; No. 10, 2.35c to 2.45c; flange steel, 2.40c to 2.50c.

RAILS AND TRACK SUPPLIES.—The demand for both light and heavy rails has been very brisk, the inquiries aggregating 60,000 tons, among which is one order for 40,000 tons from a Western road. Standard sections predominate in this tonnage. All the prospective buyers ask for deliveries this year. Track supplies have also been active, the leading producer having sold its capacity on bolts. We quote heavy rails, $28; light rails, 45 pounds, $34 to $35; 12 pounds, $40 to $41, with regular differentials for intermediate sizes. Track supplies, mill shipments, are quoted as follows: Angle bars, 2c to 2.10c; spikes, first quality 2.25c (out of store, 2.40c to 2.50c rates); second quality, 2.15c; track bolts, 3½x¾ with square nuts, 2.85c to 3c per 100 pounds; with hexagon nuts, 3.05c to 3.15c, with usual differentials for other sizes.

MERCHANT STEEL.—A little new business is coming forward all the time, but owing to the crowded condition of mills, producers are not seeking to add to their tonnage. Specifications are good. We quote mill shipments, Chicago delivery, as follows: Spring steel, 2.65c to 2.75c; sleigh shoe, 1.95c flat sizes; concave and convex, 2c; out of store, 2.15c; cutter shoe, 2.50c to 2.60c; machinery steel, 2.15c to 2.25c base; plow steel, 2.50c and upwards, according to quality; toe calk, 2.30c to 2.40c; out of stock, 3c to 3.10c; ordinary tool steel, 6c to 7c; specials, 13c and upwards; less than carload lots 5 to 10 percent higher; cold rolled shafting, carload lots, 47 percent off; less than carload lots, 42 percent off.

MERCHANT PIPE.—There is a good demand for all sizes of pipe, the only difficulty being in getting material. The congestion of traffic between this city and Pittsburg is seriously handicapping jobbers, several weeks being required for cars to reach their destination. There is no change in prices, which we quote to consumers, carload lots, mill shipments, random lengths, f. o. b. Chicago, as follows:

	Steel Pipe.		Guaranteed Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
¼ to ⅜ in inclusive	66.35	56.35	63.35	53.35
½ inch	68.35	58.35	65.35	55.35
¾ to 6 inches, inclusive	73.35	63.35	70.35	60.35
7 to 12 inches, inclusive	71.35	61.35	68.35	58.35

Less than carload lots, 12½ percent advance over above prices.

BOILER TUBES.—There is no change to report, demand being fully up to expectations. We quote below prices on carload lots, mill shipment, f. o. b. Chicago. On less than carload lots from mill, 12½ percent is to be added:

	L. W. Steel Percent.	C. C. Iron Percent.
1 to 1½ in	43.35	38.35
1¾ to 2½ in	55.85	35.85
2¾ to 5 in	60.85	45.85
6 to 13 in	55.85	35.85

For lots direct from warehouse stock:

	L. W. Steel Percent.	C. C. Iron Percent.
1 to 1½ in	40	35
1¾ to 2½ in	50	32½
2¾ to 5 in	57½	42½
6 to 13 in	50	32½

CAST IRON PIPE.—The demand for pipe is very slight, notwithstanding that this is the time of the year when contracting usually begins. Manufacturers are experiencing considerable difficulty in getting cars for their southern plants. We quote f. o. b. Chicago, 4-inch water pipe $34; 6-inch, $33; 8-inch and upwards, $32; gas pipe, $1 a ton higher.

BILLETS AND WIRE RODS.—Twenty-five hundred tons of foreign billets have been sold in the Eastern market by a local jobber, which is the only sale reported. We quote wire rods (the last sale) $37.50 Chicago; domestic Bessemer billets (the last sale) $30.50; open hearth billets for forging purposes, $36 to $38; for use in rolling mills, $32.50 to $33. German basic Bessemer billets, Chicago delivery, are quoted $31 to $31.50. Special carbons are higher.

WIRE NAILS AND FENCING.—The advance recently made in bale ties has stimulated the demand and orders for this product are coming in freely. Wire nails, plain wire and barb fencing are also in active demand, dealers in all parts of the country begging for more prompt shipment of material. The wire mills of the leading producer at Joliet have again been compelled to shut down owing to the scarcity of coke, and it is understood that the DeKalb and Waukegan mills are skating on thin ice. We quote prices to jobbers, Chicago delivery, as follows: Wire nails, carload lots, $2.20; less than carload lots, $2.30. Cut nails, steel, carload lots, $2.26½; less than carload lots, $2.36½. Plain wire, $2.10 carloads, and $2.20 in smaller lots; galvanized plain wire, carloads, $2.40; smaller lots, $2.50. Barb wire, carloads, $2.50; less than carloads, $2.60; galvanized barbed wire, $2.80 carloads, and $2.90 less than carload lots. Staples, carloads, $2.30; smaller lots, $2.40; galvanized, carloads, $2.60; smaller lots, $2.70. Bale ties, 85 percent discount f. o. b. Waukegan on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet or DeKalb, with actual freight allowed not exceeding 50 cents per 100 pounds.

COKE.—Receipts of coke have fallen off again during the week under review, and a number of large consumers have had to close their plants for the time being. We quote Southern coke, $9 to $9.50 Chicago; Connellsville, $10 to $10.50 Chicago.

OLD MATERIAL.—Buying of scrap has been active during the week, the demand covering all kinds of material. We quote gross tons, as follows:

Old iron rails	$23 50 to 24 00
Old steel rails (mixed lengths)	18 00 to 18 50
Old steel rails (long lengths)	21 50 to 22 00
Relaying rails	31 50 to 32 00
Old wheels	23 00 to 23 50
Heavy melting steel	17 00 to 17 50
Mixed country steel	15 00 to 15 50

The following are selling prices per net ton:

No. 1 R. R. wrought	$19 50 to 20 00
No. 2 R. R. wrought	18 00 to 18 50
Shafting	19 00 to 19 50
Dealers' forge No. 1	16 50 to 17 00
No. 1 busheling and wrought pipe	14 00 to 14 50
No. 1 cast	16 50 to 17 00
Railway malleable	15 50 to 16 00
Country malleable	14 50 to 15 00
Iron axles	23 50 to 24 00
Steel axles	19 50 to 20 00
Cast borings	10 00 to 10 50
Mixed borings, etc	9 50 to 10 00
Wrought turnings	13 50 to 14 00
Machine shop turnings	13 00 to 13 50
Iron axle turnings	14 00 to 14 50
Steel axle turnings	13 50 to 14 00
Stove plate and light cast scrap	12 50 to 13 00
Old iron splice bars	21 00 to 21 50

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, March 11.

IRON ORE.—Sales of Lake Superior ore for the coming year began this week, and on Monday quotations were generally made to consumers. Prices are generally on the basis heretofore indicated, an old-range Bessemer ore running 63 percent in iron, .045 percent in phosphorus and 10 per cent in moisture selling for $4.50, and a Mesabi ore of like analysis and of high physical quality, for $4. Non-Bessemer ores from the old ranges are held at figures from 30 to 35 cents above last year's, an ore showing 60 in iron and 12 percent in moisture bringing $3.60, while a corresponding Mesabi ore sells for $3.20. What effect the narrowing of the differential that has long existed between old-range and Mesabi ores will have upon the sale of the latter remains to be seen. Recent sieve tests go to show that the common characterization of Mesabi ores as fine and dusty has been quite too indiscriminate. There is vastly more good lumpy ore on that range than has been generally credited. The use of the large percentages of these ores in the furnaces of the Central West has probably not been any more due to the devising of better means of handling them in the furnace than to the fact that furnacemen have taken more pains than the ore trade to discover the physical qualities of many of these ores, and have found that many of them were quite as easily handled in the furnace as, for example, some of the well known soft ores of the Gogebic range.

It is too early to say much about the ore market for 1903. Some sales have been made, but they have been largely the expected sales, those made to buyers who knew months ago that they would take in the main the ores they had last year. The wait in the pig iron market may cause some holding back on ore. Lake freights are still unsettled, but there is a general leaning to an 85-cent basis. The ideas of shippers are perhaps indicated by the allowance of 60, 70 and 80 cents from Escanaba, Marquette and Duluth respectively, made in the case of buyers who choose to contract for their ore at upper lake ports and make their own shipping arrangements. Last year, when these allowances were the same as above, the ore buyer who made his own vessel contracts saved

something from the allowance. The reverse may be true this year. The outlook is for no better dispatch than in 1902, and the longer season now looked for will do more than take care of the expected increase in the movement. Docks are so full of ore that in some cases it will be necessary to take practically all the new ore forward direct. Some relief might be secured if there should be a heavy shipment from the docks to furnace yards in the weeks before navigation opens.

COKE.—The coke situation shows signs of improvement, the shipments this week and the latter half of last week being more nearly up to requirements than at any time this winter. Prices remain the same, $7 to $7.50 for spot and $5.75 for Connellsville foundry at the ovens, for the first half. For furnace coke, $5.50 is the prevailing price. Foundries do not show a disposition to buy for the last half, evidently depending on new construction of ovens and better railroad service to lower the price.

PIG IRON.—The market continues quiet, as it has been for three months. Occasionally there have been indications that heavy buying would soon begin, and some sales of fair size have been made, but for the most part the condition has been one of waiting by the buyers for lower prices, while the sellers have shown no signs of making concessions. This condition may continue for a month longer, but it is confidently expected that before May 1 there will be much more activity in the pig iron market. Furnace owners declare that they are not anxious to make sales and some cases of persistent efforts to obtain concessions are reported, without result. Southern Ohio No. 2 foundry still commands $22 at the furnace, or $23.45 Cleveland, for the first half, and the same prices are quoted for the last half, but it is probable that the Southern Ohio furnaces will be compelled to come pretty near the Valley price for deliveries after July 1; that is, $21 at the furnace for No. 2. Negotiations reported last week for basic at $20 at the furnace for last half have not been closed. No sales of gray forge have been reported for several weeks. We quote as follows, f. o. b. Cleveland, for shipments in the first half of 1903:

Bessemer	$21 85 to 22 85
No. 1 Strong Foundry	23 00 to 23 50
No. 2 Strong Foundry	22 50 to 23 00
No. 3 Foundry	21 75 to 22 25
Scotch No. 1	23 00 to 23 50
Scotch No. 2	22 50 to 23 00
Gray Forge, Valley	20 00 to 20 25
Lake Superior charcoal	26 50 to 27 50

FINISHED MATERIAL.—Contradictory reports are heard concerning bar iron. One of the leading producers has advanced its price to 1.85c Youngstown for iron shipped from Youngstown. Another large producer is selling at 1.80c Youngstown, but other concerns are said to be selling as low as 1.75c. The situation is much stronger east of Cleveland and Youngstown than west. One of the largest consumers east of Cleveland has placed an order for its requirements for the first half of 1904 and the price is said to have been 1.80c Youngstown. Some of the mills in the East advocate advancing the price to 1.90c. Steel bars, at 1.60c for Bessemer and 1.70c for open-hearth, Pittsburg, continue in good demand. Agricultural interests have not yet appeared in the market. The prospect of a general strike of structural iron workers has caused uneasiness this week, but as yet the effect has not been important in this city. Agreement quotations on structural material are as follows: Beams and channels, 3 to 15 inches, 1.70c; 18 to 24 inches, 1.80c; tees, 1.75c; zees, 1.70c; angles from 3 to 6 inches, 1.70c; universal mill plates, 1.70c. The improvement in the sheet market continues. The demand is stronger, especially for galvanized. The prices of the principal producers, through jobbers, are as follows: For 3-16-inch sheets and heavier, 2.15c, Cleveland. Mill sales of black sheets, Cleveland, to consumers: No. 24, 2.65c to 2.75c; No. 26, 2.75c to 2.85c; No. 27, 2.85c to 2.95c; and the following prices out of stock: No. 10, 2.35c to 2.50c; No. 12, 2.45c to 2.60c; No. 14, 2.50c to 2.60c; No. 16, 2.55c to 2.70c; Nos. 18-20, 2.75c to 2.90c; Nos. 22-24, 2.85c to 3c; Nos. 25-26, 2.95c to 3.10c; No. 27, 3.05c to 3.20c; No. 28, 3.15c to 3.30c. On galvanized sheets we quote mill sales in carload lots, Cleveland, as follows: Nos. 10 and 11, 2.60c; Nos. 12-14, 2.70c to 2.85c; Nos. 18-21, 3c to 3.15c; Nos. 22-24, 3.30c to 3.45c; Nos. 25-26, 3.55c to 3.70c; No. 27, 3.80c to 3.95c; No. 28, 4.05c to 4.20c; No. 29, 4.45c to 4.60c; No. 30, 4.95c to 5.10c. Galvanized sheets out of stock are quoted at 75 and 2½ off.

OLD MATERIAL.—The demand for nearly all kinds of scrap is strong. This is especially true of low phosphorus material used by steel casting concerns, which has been sold as high as $26. Some of the rolling mills which have been most active in competing for orders for bar iron have been making a determined effort to reduce the price of scrap which they use, but they have not been successful. We quote Cleveland delivery, all gross tons, as follows:

Old iron rails	$25 00 to 26 00
Old steel rails (over 6 feet)	22 00 to 23 00
Old steel rails (6 feet and under)	20 00 to 20 50
Old car wheels	24 50 to 25 00
No. 1 R. R. wrought scrap	22 00 to 22 50
Mill scrap	19 00 to 19 50
No. 1 machine cast scrap	21 00 to 21 50
Iron axles	29 00 to 30 00
Steel axles	28 00 to 29 00
Axle turnings	18 00 to 19 00
Wrought turnings (free from cast)	16 00 to 17 00
Cast borings	11 00 to 11 50
Uncut wrought iron boilers	13 00 to 13 00
Steel boiler plates	18 00 to 19 00
Grate bars	13 00 to 14 00
Pipes and flues (clean)	17 50 to 18 50
Tank iron	17 00 to 18 00
Hoop and band iron	13 50 to 14 50
Sheet iron	12 00 to 13 00
Wrought drillings	15 50 to 16 50
Malleable iron (railroad)	19 00 to 19 50
Malleable iron (agricultural)	17 50 to 18 00
Stove plate	16 00 to 17 00
Heavy steel	19 00 to 20 00

CINCINNATI.

March 10

General conditions remain practically the same this week as for the past 30 days. The coke market is quiet and slightly easier, with $6 per ton at the ovens fairly representing the market.

PIG IRON.—The market in what may be termed Cincinnati territory has been quiet the past week, with no important changes in prices. Buyers show no disposition to come into the market for anything but small lots to cover immediate needs. Sellers are still maintaining prices and the waiting situation has been prolonged another week. So little being done in contracts for future wants that interest is centered upon spot and quick shipment transactions. Dull trade has stimulated efforts on the parts of sellers to attract attention of buyers to the odd lots or such quick shipment iron as they had to offer, resulting in freely advertising inside quotations current in the trade until the buyer has become well acquainted with the fact that No. 2 foundry can be had without difficulty at $18 Birmingham. Some small lots still bring $18.25, but the bulk of the business is on the $18 basis. A little No. 3 foundry has sold at $17.50 Birmingham. Gray forge is receiving some attention with sales at $15.75 Birmingham and round lots offered as low as $15.50 Birmingham, but $16 Birmingham is still the current asking price. Ohio furnaces are still doing the bulk of the business in the Eastern half of the State and are said to have sold foundry iron as far west as Chicago. The Southern furnaces are still not disposed to compete with Northern irons where it would be necessary to shade $18 Birmingham for No. 2 foundry. While the market is dull and there is an ample supply of spot iron for the limited demand, and sellers are zealous in their efforts, the market may be called easy only to the extent that inside quotations represent the trading basis. There is no disposition among sales agents to shade present prices, and the disposition to hold the market at its present level until the buying movement so long expected begins is well established. We quote for quick delivery f. o. b. Cincinnati:

Southern Foundry No. 1	$22 00 to 21 50
Southern Foundry No. 2	21 25 to 21 50
Southern Foundry No. 3	20 75 to 21 25
Southern Foundry No. 4	19 75 to 20 75
Southern Foundry No. 1, soft	22 00 to 22 50
Southern Foundry No. 2, soft	21 25 to 21 75
Gray Forge	18 75 to 19 25
Northern Foundry No. 1	24 15 to 24 65
Northern Foundry No. 2	23 15 to 23 65
Southern car wheel iron	27 75 to 28 75

FINISHED MATERIAL.—The demand continues fairly active. A disposition is noticed to use steel bars at the lower price in place of bar iron. The jobbing demand continues fair but jobbers are not anticipating their wants. Orders from railroad shops, however, are largely increased and the monthly specifications for material are heavier than for some time. Prices remain steady and unchanged. Prices for bar iron

in carload lots are: 1.90c base, half extras f. o. b. Cincinnati; steel bars, 1.73c base, half extras f. o. b. Cincinnati. Both are retailed at 2.20c base, full extras out of store. Sheets are in fairly active demand and steady. We quote black sheets No. 27 at 2.78c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 3.10c; No. 27, 3.20c; No. 16, 2.70c; No. 14, 2.60c; No. 12, 2.50c; No. 10, 2.40c. Galvanized sheets in car lots sell at 75 and 10 percent off; less than car lots 70 and 10 percent off. Tank plates are firm and sell out of store at 2.25c for ¼-inch and 2.35c for 3-16-inch. Beams and channels are quoted at 2¼c to 2¾c from stock, and angles at 2.15c to 2.25c for base sizes.

The merchant pipe market continues active with the leading interest taking an increasing share of the business at schedule prices. Merchant pipe and boiler tubes are quoted as follows for carload lots f. o. b. Cincinnati:

MERCHANT PIPE.

(Basing discounts.)

	Steel Pipe.		Guaranteed Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛, ¼, ⅜-inch	66.8	56.8	63.8	53.8
½-inch	68.8	58.8	65.8	55.8
¾ to 6-inch, inclusive	73.8	63.8	70.8	60.8
7 to 12-inch, inclusive	71.8	61.8	68.8	58.8

BOILER TUBES.

	Steel Percent.	Iron Percent.
1 to 1½ in	43.8 & 5	38.8 & 5
1¾ to 2½ in	56.3 & 5	36.3 & 5
2¾ to 5 in	61.3 & 5	46.3 & 5
6 to 13 in	56.3 & 5	36.3 & 5

OLD MATERIAL.—The market continues steady with no change in prices. For some descriptions the demand is rather light with buyers disposed to hold off. We quote:

Old No. 1 wrought railroad, net tons	$18 50 to 19 00
Cast machine and foundry, net tons	17 00 to 17 50
Old iron rails, gross tons	22 50 to 23 00
Old steel rails, gross tons	21 50 to 22 00
Old short lengths, gross tons	17 50 to 18 00
Old iron axles, net tons	27 00 to 27 50
Old chilled car wheels, gross tons	22 00 to 22 50
Stove plate, net tons	11 50 to 12 00
Wrought turnings, net tons	15 00 to 15 50
Cast borings, net tons	12 00 to 12 50

NEW YORK.

OFFICE OF *The Iron Trade Review*,
Room 1909, No. 150 NASSAU ST., March 10.

PIG IRON.—Whatever activity prevailed in the local pig iron market during the past week was mainly in foreign irons, in which some round lots changed hands. German irons were especially active and sales aggregating at least 10,000 tons were effected. Prices averaged from $20.50 to $21 per ton at this port, duty paid, with deliveries extending into July. The buying was mostly done by those who had not made provision, in whole or in part, for such supplies as they will need during the first half of the year. Inquiries for German iron have grown in volume recently, opinion being pretty general that it gives more satisfaction than any foreign iron entering this market. It is said that makers, encouraged by the present and prospective trading, are disposed to demand higher prices than conditions warrant. Sales aggregating a good tonnage await the concession that will close them. In English irons a strong situation is also noticeable, and many important contracts have been closed in Middlesboro No. 3 at $18.50 and $18.75, New York delivery, duty paid. Representatives of foreign furnaces say that inquiries for the second half are being made, but the furnaces will only quote tentative prices, believing that it is a little too early yet for such business. The market for Scotch irons is strong, but we do not hear of any great demand for them emanating from this vicinity.

In domestic brands spot iron is eagerly sought, but very little is obtainable, and where it is prices paid are generally as high as those which have obtained at any time during the past few months. Deliveries on old contracts, on the whole, are improving, but complaints as to fuel do not seem to lessen. Inquiries for the second half are being made, but no notable business has accrued. Southern furnaces are not giving this market much attention, claiming that the Middle West offers better opportunities for trade. We quote: No. 1 X Northern, $23.25 to $24.25; No. 2 X, $22 to $22.75; No. 2 plain, $21 to $21.75; Southern No. 1 foundry, $23 to $23.50; No. 2 foundry, $20 to $22.50; No. 3 foundry, $21.50 to $22; No. 4 foundry, $20.50 to $21.

BILLETS.—The market for German billets continues excellent, but producers are unable to make deliveries with the haste desired, on account of an improved home situation. Prices are firmer; Bessemer basic being quoted at $28 to $28.50, and open-hearth at $29 to $29.50 in large lots, New York delivery, duty paid.

FINISHED IRON AND STEEL.—During the week the American Bridge Co. booked the following contracts: 2,750 tons for the Southern Pacific Railroad; 1,000 tons for the Georgia Railroad; 500 tons for the Boston and Maine Railroad; 2,000 tons for an office building in Detroit, and 900 tons for a similar structure in St. Louis. The company has a strike in every city in the country where it has construction work going on, and where a labor union exists. The men have not asked the company to grant them any increase in wages, nor to remedy any real or imaginary wrongs, and outside influences are suspected of having induced them to adopt their present course. In Chicago the company's workmen have refused to quit. The sheet market shows a better feeling than has prevailed in months. The hesitancy heretofore shown by buyers has greatly disappeared, and jobbers here say they can't get material quick enough. Prices show a decidedly stiffening tendency also. Conditions in plates and bars are the same as previously detailed. New York prices are as follows: Beams and channels, 15 inches and under, 1.75c to 1.90c; angles, 3 to 6 inches, 1.75c to 1.90c; zees, 1.75c to 1.90c; bulb angles, 2.05c to 2.35c; deck beams, 2.05c to 2.25c; sheared steel plates, tank, 2.10c to 2.15c; flange, 2.25c to 2.30c; fire box, 2.30c to 2.50c; refined iron bars, 1.95c to 2.10c; soft steel bars, 1.95c to 2.10c; steel sheets, in carloads, New York, No. 28 black, 3.10c to 3.15c; galvanized, 75 and 5 off.

PHILADELPHIA.

March 10.

The mild weather and improved railroad service are making it easier to secure prompt deliveries, but there is little change in prices and the situation continues strong. There is some uneasiness on account of prospective labor troubles.

PIG IRON.—The market has been more active in low grade irons, especially gray forge, which has advanced about 50 cents. Basic is stronger. Foundries are well supplied with orders, but are not disposed to contract for iron beyond the first of July. The coke supply is better, as foundries are receiving shipments promptly. Foreign iron is coming in at about $20.75 ex-ship duty paid for good qualities of German in lots of 500 tons and upward. We quote as follows: No. 1 X foundry, $23.50 to $24.00; No. 2 X foundry, $22.25 to $22.75; No. 2 plain, $21.50 to $22.00; gray forge, $19.50 to $20.50; Middlesboro No. 3, $21.00 to $21.50; Scotch, $22.50 to $23.50; basic, $19.75 to $20.50.

BILLETS.—The market is somewhat unsettled. For foreign steel $28.50 is paid for lots of 500 tons and larger lots could be purchased at $28 or less. American steel commands $32 to $35 according to dates, specifications and analysis.

FINISHED MATERIAL.—Unless strikes interfere, business will be excellent the coming summer. There is a good demand at present, but specifications are coming in slowly. We quote as follows: Plates in small lots, 2.10c to 2.15c; carload lots, ¼-inch and thicker, 2c to 2.05c; universals, 2c to 2.05c; flange, 2.10c to 2.20c; firebox, 2.25c to 2.30c; marine, 2.30c to 2.35c. Steel bars, 1.80c to 1.90c, prompt shipments from local mills; Western steel, 1.75c to 1.80c; bar iron, 1.93½c to 1.98½c for carload lots as minimum quantity. Structural material in small sizes continues at 1.73½c to 1.80c; large sizes, 1.90c to 2.10c.

OLD MATERIAL.—Prices are strong and the demand is good. We quote as follows: Old steel rails, $21.50 to $22.00; miscellaneous heavy steel scrap, $21.00 to $21.50; low phosphorus scrap, $26.50 to $27.50; old steel axles, $27.00 to $28.00; old iron axles, $30.00 to $31.00; old iron rails, $25.00 to $26.00; old car wheels, $24.50 to $25.50; choice scrap R. R. No. 1 wrought, $23.50 to $24.00; country scrap, $21.00 to $22.00; machinery cast, $19.50 to $20.50; No. 2 light scrap (forge), $17.50 to $18.00; No. 2 light scrap (ordinary), $14.00 to $15.00; wrought turnings, $16.00 to $16.50; wrought turnings, choice heavy, $16.75 to $17.50; cast borings, $11.00 to $11.50; stove plate, $15.00 to $16.00.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM NO. 1909, 150 NASSAU ST. March 10.

PIG TIN.—The upward movement in tin suffered a slight setback during the week, because of the announcement that some 3,000 tons would be offered at the forthcoming Banca sale, which is much larger than was expected. Students of the statistical situation say that while it is no better now than it was at this time a year ago, yet prices are 5 cents per pound higher. In London in the past week prices receded considerably, both spot and futures being at least £3 lower. Closing prices at the Metal Exchange today, which are the lowest for the week, follow: Spot to March, 29¾c to 30c; April and May, 29.90c to 30.10c. Closing London prices today follow: Spot, £135 12s 6d; futures, £136. Arrivals at Atlantic ports for the month to date aggregate 1,417 tons, with 3,670 tons afloat.

COPPER.—The copper market has been particularly strong during the past week, and prices have advanced daily. The metal has passed the 14-cent point, and sellers say that the demand for it has increased appreciably. The trade views the statement with suspicion, especially since it is coupled with the assertion that the export business is constantly improving. As a matter of fact, statistics show that the exports for this year to date, are some 40 percent lower than for a corresponding period last year. Dealers in secondhand copper say that with all the great advance in new copper recently, they cannot get any more for their material now than before. This is taken by the trade to prove that consumption is not keeping pace with production to the extent recent reports indicate. The London market for the week has been very strong, and prices are over £2 higher. Closing prices at the Metal Exchange today were as follows: Lake, 14¼c to 14½c; electrolytic, 14.10c to 14.50c; casting, 14c to 14½c; standard, 13½c nominal. London closed today as follows: Spot, £63 2s 6d; futures, £63 7s 6d. Exports for copper for the month to date amount to 2.517 tons.

LEAD.—The American Smelting & Refining Co. raised the price of car load lots yesterday from 4.12½c to 4.37½c, claiming that the European situation had sufficiently improved to justify it. St. Louis is stronger at 4.15c to 4.35c. London is higher at £13 10s.

SPELTER.—Prices have greatly strengthened during the week, the trade situation being represented as much better. Here the price is 5.15c to 5.20c. St. Louis is quoted at 5c, and London at £22 10s, both higher than at our last writing.

ANTIMONY.—The market is without change, Cookson's being 8½c to 8¾c; Hallett's, 7è; and other brands, 6¾c to 7c.

NICKEL.—Large lots can be had at from 40c to 50c, and smaller lots at from 50c to 60c.

QUICKSILVER.—Jobbers only are in the market, and sales have been made on the basis of $48 per flask in lots of 100 flasks. London, £8 15s.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
519 MONADNOCK BLOCK, March 10.

The metal market continues to gain in strength, and prices on copper, pig lead and spelter have advanced. Buying has been active, the outlook being very encouraging. We quote lake copper, carload lots, 14½c, smaller quantities, 15c. Pig lead, 4½c in 50-ton lots. Pig tin, 33c. Spelter, 5¼c for carload lots, and 5¾c for lesser quantities. Sheet zinc, 6¼c for lots over 600 pounds. Antimony, 10¾c to 11c for Cookson's, and 9¾ for Hallett's in small quantities. Old metal has been in good demand, the following quotations ruling: Copper wire, $11; heavy copper, $10.75; light copper, $9.75; red brass, $10.75; yellow brass, $8; light brass, $6.75; old lead, 3c; zinc, 3c.

The Default Provision in Steel Corporation Bonds.

The default clause covering the issue of $250,000,000 of second mortgage bonds by the United States Steel Corporation is very interesting for the reason that it provides that no action at law can be taken, unless interest on the bonds is defaulted for a period of two years. Under this clause the steel corporation will be protected for 24 months in case it cannot meet the interest on these bonds, which is regarded a sufficient period of time, should the emergency arise, to earn or raise sufficient funds to meet these obligations. The clause follows: "Under the said bonds and the instruments securing the same no action or proceeding, either at law or in equity, can be instituted or maintained for the enforcement or collection of interest on the bonds, or for maturing the principal thereof by reason of a default by the steel company in the payment of any instalment of interest, until after such default in the payment of such instalment shall have lasted for the period of two years continuously."

The stack of the Cherry Valley Iron Co., Pittsburg, located at Leetonia, O., has been blown out for relining. It is expected that the stack can again be placed in operation about April 1, as the work of relining is being pushed with all speed.

At a meeting of the board of directors of the Crucible Steel Co. of America, held Tuesday, March 10, at Pittsburg, Pa., Reuben Miller resigned as president, and Frank B. Smith was elected president. He will also continue to hold the position of general manager which he assumed about a year ago. James K. Park, third vice president, also resigned, but no successor has been elected to fill the position. In the retirement of these two gentlemen the steel trade of the Pittsburg district loses men who have been actively engaged in its growth for the past thirty years. Mr. Miller was at the head of the Crescent Steel Co., which was absorbed by the Crucible Steel Co. of America, and Mr. Park was identified with the Park Steel Co. at the time of its absorption.

A meeting of the creditors of the Continental Iron Co. was held at Warren, O., with the referee and trustee, on Tuesday, March 10, the referee desiring to hear any objections that might be made to the proposed sale of the Wheatland plant. None were made and an order for the sale of the property on May 19 was accordingly entered by the court. Meantime a reappraisal of the property will be made.

The Alberger Condenser Co., 95 Liberty St., New York, has acquired control of the Newburg Ice Machine & Engine Co., Newburg, N. Y., which has been long known as a builder of Corliss engines and ice machines. The Alberger Condenser Co. will devote this plant principally to the manufacture of condensers, vacuum pumps and Corliss pumping machinery which they are using extensively in connection with high vacuum condenser installations. Recent developments tend toward the improvement of the parts that make up the condensing equipment, this being largely brought about by the demand for an extremely high vacuum in connection with steam turbines. The Alberger Condenser Co. retains close connection with the Quintard Iron Works of New York City.

The Stowe-Fuller Co., of Cleveland, has bought a large interest in the Olive Hill Fire Brick Co., Olive Hill, Ky., whose plant will be more than doubled in capacity to take care of the increasing Western and Southern trade. The output of this plant with the increased output of its Ohio and Pennsylvania factories, gives this company a new place in the list of shippers of fire brick and refractory materials. It has shipped special brick in the last year to Japan, New Zealand, Australia, Germany, England and Cuba. It is now supplying over 1,000 cars of brick for the furnace and coke ovens of the Cleveland Furnace Co. of Cleveland, and for the new work of the Emma furnace at Newburg, O.

This week the twenty mills of the American Tin Plate Co., at Sharon, Pa., commenced operations on Bessemer tin bars, having operated on open-hearth bars ever since the plant was in operation. The steel is being shipped both from Newcastle and Youngstown, O., while the open-hearth steel which is produced at Sharon and was heretofore rolled into tin plate will find its way into plates and other heavier products.

WAGE SETTLEMENT IN CLEVELAND FOUNDRIES.

On Feb. 17 the Cleveland foundrymen who operate heavy jobbing foundries were presented with a series of demands from local union No. 218 of the Iron Molders' Union, as follows: A minimum wage-rate of $3 per day; an advance of 10c to every molder upon his present wages; a nine-hour day instead of 10 hours as at present. The Cleveland foundries in question have been operating under an agreement with their molders for the past year providing for a minimum wage rate of $2.90 for a day of ten hours, for both floor and bench molders. On Feb. 27 a committee of five members of the local union and five foundrymen met in conference and held sessions continuing nearly two days. After discussing the proposition submitted by the molders, and a set of counter-demands made by the foundrymen, the conference finally adopted a joint resolution in which the representatives of each side agreed to recommend to their respective organizations a minimum rate of $3 a day and an advance of 10 cents a day to each molder, the day to be of 10 hours as at present. This recommendation was approved by the molders' union and the foundrymen, and the committee thereupon drew up and signed the following agreement for the coming year:

Agreement made this fourth day of March, 1903, between the members of the Cleveland Founders' Association who operate union jobbing foundries, and Local Union No. 218 of the Iron Molders' Union of North America, witnesseth:

First. That the members of the Cleveland Founders' Association whose foundries have been involved in a demand for an increase in wages on the part of their molders at the time this agreement was signed, shall, on and after March 17, 1903, pay to their molders a rate of wages in harmony with the following schedule: A. The minimum rate of wages on and after March 17th, 1903, shall be $3 per day of ten hours. B. The molders involved in this controversy shall be paid an increase of 10 cents per day upon the rate paid them on March 16, 1903.

Second. That time and one-half shall be paid for all overtime, and double time for Sundays and legal holidays, to-wit: Fourth of July, Labor Day, Thanksgiving Day and Christmas.

Third. That the conditions existing regarding hours of work in the foundries in the city of Cleveland, O., shall be the same for the ensuing year as for the year just past.

Fourth. That it is hereby mutually agreed and understood that in case of any arrangement being made by the officers of the International Iron Molders' Union of North America, and the National Founders' Association, having any reference to the question of differentials now under consideration by the officers of either association, it shall be made a part of this agreement, and that all parties hereto shall be bound by any national agreement that may be made or entered into between the representatives of both associations at any time during the life of this agreement.

Fifth. That this agreement shall be in force and effect for one year from March 17, 1903. Should either party desire to change any of the provisions of this agreement, not hereinbefore provided for, thirty days' notice prior to its expiration shall be given. If no notice is given by either party, this agreement is to be in effect for the next following year, and so on.

This settlement is one that is highly satisfactory to both parties, and in view of the bitterness and ill-feeling engendered by the long struggle of 1900-01, indicates that a much better understanding now exists between employer and employe in the Cleveland foundries. The molders were particularly pleased over the fact that this settlement of their difficulties was accomplished without the intervention of either their national officers or any officer of the National Founders' Association. Before the close of the final conference, another joint resolution was adopted and is as follows:

WHEREAS, Representatives of Iron Molders' Union No. 218, and representatives of the Cleveland Founders' Association have met in conference for the purpose of settling differences between their respective bodies; and

WHEREAS, It is our opinion that the conferences thus held have been productive of great good and mutual enlightenment, and have in fact succeeded in settling the difficulties that have confronted us; therefore be it

Resolved, That we shall meet next year, should it become necessary, in the same spirit of friendliness and good will that has been exhibited by both parties on this occasion; also

Resolved, That any measures that can possibly be devised by our local officers to do away with petty disputes arising from time to time in the various foundries shall receive our hearty approbation; and be it further

Resolved, That we recommend to our respective bodies the appointment of a special arbitration board, composed of five members on each side, for the purpose of taking up and endeavoring to settle any shop disputes that may be referred to said board, as a method of securing speedy and equitable judgment on any serious controversy that may arise locally.

TRADE PUBLICATIONS.

The March, 1903, catalogue and price list of oil burners and equipment is intended to take the place of the exhausted edition of catalogues 2 and 3 of the National Oil Burner & Equipment Co. of St. Louis. The present publication is standard size, 6x9 inches, and treats at length on the question of economy as well as the safety devices controlled by numerous automatic safeguards, etc.

The steel rolling doors, shutters and partitions manufactured by the Columbus Steel Rolling Shutter Co. of Columbus, O., are illustrated and described in an 8x11-inch pamphlet. The matter of attaining greater protection against fire will render the advent of such a publication of considerable interest. The construction of the various syles of doors are given prominence and a number of halftones materially assists the reader.

H. A. Croxton, of the Massillon Iron & Steel Co., of Massillon, O., has compiled a "Pocket Companion" containing useful information and tables appertaining to the use of pipe castings, flange pipe and fittings as manufactured by this company. The work comprises the new catalogue and hand book of cast iron pipe and fittings and is a 175-page 4x6½-inch volume bound in leatherette. The work has been prepared to meet the requirements of water works superintendents, engineers and contractors, and it contains a number of useful tables and other data designed to enable a busy man to reach correct conclusions without waste of time.

The Van Buren, Heck & Marvin Co. of Findlay, O., is a combination of the forces of S. C. Van Buren's Sons & Co. and the Heck & Marvin Co., manufacturers of ditching machinery. Their recent catalogue discourses on the Buckeye traction ditcher and the account is most readable. The compiler has adopted a plain, straightforward style which is a refreshing change from the hackneyed form trade circulars frequently adopt.

A booklet of a few 3x6-inch pages forms a descriptive price list of the crayons and pencils manufactured by the D. M. Steward Mfg. Co. of Chattanooga, Tenn. These are for use by metal workers and it is claimed that the mark will not disappear when used on iron and heated.

Several of their original and striking calendar blotters for the month of March have been received from the Joseph Dixon Crucible Co. of Jersey City, N. J.

"Hard Water Made Soft" is the title of a 6x9-inch pamphlet published by the Industrial Water Co. of New York. The advantages of clear and soft water for steam boilers are discussed and a number of representative installations are illustrated.

The annual catalogue of the brick machinery and brick yard supplies manufactured by the Henry Martin Brick Machine Mfg. Co. of Lancaster, Pa., covers 132 pages and is standard size, 6x9 inches. It is interesting to note that the firm has had the benefit of 45 years of study in the art of brick making and now has a plant covering over two acres of floor space. General catalogue No. 70 is profusely illustrated.

The ready reference cards sent out with the compliments of the Cleveland Twist Drill Co. of Cleveland evidence an acquaintance with human nature. Here are three plainly printed cards in red and black and made of stout stock, say, 1-16 of an inch thick. The cards are perforated at the end, supplied with businesslike eyelets and united by a brass ring. A peg positively aches for that ring in many a shop, as the cards are covered with information about the speed of drills, decimal equivalents, dimensions of taper shanks of drills, the U. S. standard of bolts and nuts, drill list for gas taps, drill list for taps with "V" threads, drill lists for machine screw and other taps. The whole thing is in too handy a form to be thrown away and has just enough of an advertising character to keep up a pleasant recollection of the sender.

The line of direct current steam turbine dynamos (units

from 1½ to 300 horsepower in size) of the DeLaval type is described and illustrated in a recent bulletin sent out by the D'Oliver Engineering Co., of Philadelphia. Among the illustrations is a 200-kilowatt turbine dynamo.

The Calculagraph Co., of New York, is sending out a circular telling a very interesting story of the value of time saved by these machines. The account refers to the experience of a telephone company using them on toll lines. The difference between the mechanical records and those made by hand showed a saving for each instrument of $70.39 a month. This suggests anew the uncertainty of making records by pencil and how much actual cost may be at variance with the one so recorded.

A circular from the Lane & Bodley Co., of Cincinnati, submits some data of a kind which will surprise the average engineer, though the facts are familiar enough among rolling mill men. A heavy duty rolling mill engine of this make is in use at the Newport Rolling Mill at Newport, Ky. The cylinder is 34 inches in diameter, stoker 72 inches, R. P. M. 30. Another engine of like dimensions but having a 32-inch cylinder and a third engine of 38-inch are also at work there. Two of these engines are running continuously 130 hours per week and have maintained the gait for some five years past. The cards taken from the engines are reproduced on the circular and illustrate graphically the extreme load variation even in so small a period as two contiguous revolutions.

"Keystone Hair Insulator" is the title of a booklet sent out from the Milwaukee office of the H. W. Johns-Manville Co. This product is employed for deadening sound and insulating buildings from either heat or cold. The composition is said to be clean cattle hair mixed with granulated cellulose and enclosed between two layers of strong non-porous paper.

Booklet No. 31, just issued by the Northern Electrical Mfg. Co., of Madison, Wis., briefly describes direct current generators. These machines are built in all standard sizes and in belted and engine types. No attempt is made to go into construction details in this booklet but the larger Bulletin No. 30 will (like No. 31) be sent on request.

A mailing card 5½x9 inches is the first of a series prepared by the R. D. Nuttall Co. of Pittsburg. The first installment contains a neatly arranged table of decimal equivalents and is soon to be followed by another card bearing a table of the standard keyways as adopted by this company. The set will doubtless prove very acceptable either in shop or office.

Catalogue "E" and price list of the Grand Crossing Tack Co., of Grand Crossing, Chicago, is standard size, 6x9 inches, and contains 94 freely illustrated pages. Tacks, fence wire, carriage, barrel, hame and trunk rivets, are of special interest to the hardware trade, but other things, such as steel rods, iron rivets, chaplets, and nails, are shown in great variety.

A well arranged folder calls attention to the old and new aspects of the Falls Machine Co. of Sheboygan Falls, Wis. The present circular is a brief announcement preceding the catalogue which is now in hands of printer and which will go more extensively into the merits of the woodworking machinery designed by Frank Diehl, who is now an officer in the company.

The 1903 catalogue of Jenkins Bros., New York, sets forth a number of improvements in the different steam specialties handled by this company. These comprise valves, discs and packing. The nut which is checked by the disc and the keyed stuffing box which prevents the nut from coming off when opening and closing the valve are interesting devices and offer remedies to common troubles in the steam plant. The catalogue is 5x8 inches and contains 80 pages.

The new catalogue of the Chase Machine Co., of Cleveland, treats briefly of deck machinery, hoisting, docking and hauling engines, steam capstans, deck hoisters and automatic steam towing machines. Charles R. Wootters is now associated with this company and has charge of the department of gas and gasoline engines. These comprise a full line of marine and stationary engines of two and four cycle construction.

We have a number of circulars from the C. W. Hunt Co. of West New Brighton, Staten Island, N. Y. These refer to electric hoists for various purposes, "Stevedore" rope and the lubricating plumbago used in the manufacture of this kind of hoisting and transmission rope.

Wyman & Gordon of Worcester, Mass., have a short story of John Fitch that is an epic of hard luck. It is the pathetic story of a mechanic who did pioneer service in mechanical engineering but failed of financial reward. The tale is an interesting accompaniment of the information that the publishers manufacture special die forgings by drop and steam hammer and hydraulic press.

The Almy patent sectional water-tube boilers manufactured by the Almy Water-Tube Boiler Co. of Providence, R. I., are described anew in the ninth edition of a neat and well illustrated catalogue. The construction of the boiler is described at length and there are many views of the numerous yachts in which this make of boiler has been installed.

The Nash Regulating Valve Co. of Detroit, has a standard size catalogue dealing with Greenaway separators. These are shown in various styles and deserve a special word of approval for the excellent halftone work showing the construction details.

The protection of iron and steel structures from rust and corrosion is the theme of a pamphlet of the Goheen Mfg. Co., of Canton, O. There are views of blast furnaces, steel plants, bridges, etc., that have been treated with the "carbonizing coating."

The stock list of the Scully Steel & Iron Co., of Chicago, is a 4½x7 pamphlet of 144 pages devoted to a wide range of commodities from iron and steel, etc., in the form of raw material to the machinery of manufacturing.

A handsomely finished poster illustrates the contrast between the original log cabin and blacksmith shop of the founder and the immense factory buildings of the Studebaker Bros. Mfg. Co. of South Bend, Ind., as they appeared a year ago, some additions having since been made. At the bottom of the poster are grouped the portraits of the five brothers.

The Canton Fillet Co. of Canton, O., has a circular which deals with a matter of some importance in the economy of pattern making. The firm manufactures leather fillet which can be applied to either right, acute or obtuse angles and irregular or curved work; it has also a line of wood fillet made from select white pine. The Belding fillet is a patented article of peculiar shape which becomes rounded to the desired curve on being forced into the angle.

Joint Republic and Cherry Valley Coke Co.

(Special Telegram.)

PITTSBURG, March 11.—The Union Coke Co., of Pittsburg, has been organized by parties connected with the Republic Iron & Steel Co., of Chicago, and the Cherry Valley Iron Co., of Pittsburg. The new company will not offer coke on the market but will consume all it manufactures in the stacks of the connected companies. The acreage of coal land in the Lower Connellsville district amounts to about 10,000 and work on the erection of 400 ovens will be immediately commenced. It is the intention ultimately to have the coking plant consist of 700 ovens. A charter for the company has been applied for by Alexis W. Thompson, Wayne Wills, Joshua W. Rhodes and Edwin N. Ohl.

The Bessemer Coal & Coke Co., with headquarters in Cleveland, has been organized with a capital of $500,000. It has purchased 2,000 acres of coal land and reports of mining engineers state that there is a vein of clean coal six and one-half feet in thickness, a considerable part of which is suitable for coking. A shaft is being put down and the company expects to be in the market by fall. The officers are the following: President, Col. James F. Branch, secretary of the American Bankers' Association, of New York; vice president and general manager, C. J. Brokenshire, former superintendent of the J. A. Beidler mines; secretary, E. M. Love; treasurer, J. C. Trask. The preliminary work is now being done under the supervision of Mr. Brokenshire. The land is situated on the Bessemer railroad, eighteen miles from Pittsburg, and that railroad will take a considerable part of the output.

THE IRON TRADE REVIEW

Devoted to the Machinery, Metal-Working and Foundry Trades, and Iron and Steel Manufacture.

PUBLISHED EVERY THURSDAY BY

THE IRON & STEEL PRESS CO.,

ROSE BUILDING, CLEVELAND, OHIO.

G. H. GARDNER, President and Treasurer,
JOHN A. PENTON, Vice-President,
A. I. FINDLEY, Secretary.

A. I. FINDLEY, - - - - - - - - - EDITOR.
ROBERT I. CLEGG, - - EDITOR MACHINERY DEPARTMENT.
GEORGE SMART, - - - - - ASSOCIATE EDITOR.

CHICAGO: 519 Monadnock Block, GEO. H. GRIFFITHS, Manager.
PITTSBURG: 429 Park Building, A. O. BACKERT, Manager.
NEW YORK: 150 Nassau St., D. C. WARREN, Manager.
THE CENTRAL WEST: R. A. EVANS, Manager.

Subscription, $3.00 per annum. To Foreign Countries, $4.00.
Advertising Rates Furnished on Application.

The Cleveland News Co. will supply the trade with THE IRON TRADE REVIEW through the regular channels of the American News Co.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER.

MARCH 12, 1903.

INCREASED USE OF PIG IRON FOR BASIC STEEL.

In 1901 the production of 1,448,850 tons of basic pig iron constituted 40 percent of the production of 3,618,993 tons of basic open-hearth steel ingots. For 1902 the production of pig iron but not of steel has been ascertained. Should the 1902 production of basic pig, 2,038,590 tons, constitute 40 percent of the basic open-hearth steel production, it would make the latter a trifle over 5,000,000 tons. This is improbable, the indication rather being that in 1902 a greater percentage of pig iron and a smaller percentage of scrap were used in basic open-hearth operations than in 1901. Also it must be remembered that what is customarily considered Bessemer pig iron production is not strictly so. It is returned in the official statistics as "Bessemer and low phosphorus pig iron." The expansion of the designation is not for the purpose of including malleable Bessemer, as that is separately returned. The fact is that some unknown quantity of pig iron, possibly above the standard Bessemer limit, but still classed as "low phosphorus" is used in basic open-hearth steel furnaces. Whatever this quantity is it should be added to the make of regular basic pig in estimating the proportions of pig iron and scrap which went into basic open-hearth steel in any given year. The probabilities are very strong that a larger quantity of such iron was used in 1902 than in preceding years, and the conclusion is well founded that basic open-hearth steel is now being made with a smaller percentage of scrap in the charge than ever before, not from choice of the steel maker, but from the scarcity and high price of scrap, a condition brought about by the sudden rise of the basic process itself. The production of 776,256 tons of basic open-hearth steel in 1896 rose to about six times as much in 1902. Naturally the scrap available did not increase in the same proportion. The condition points clearly to the employment of open-hearth processes dispensing with scrap, even though they possess disadvantages which would have barred them only two or three years ago, or a new lease of life for the Bessemer process, limited only by the supply of low-phosphorus ores.

—Since the above was written the official figures of Bessemer steel production in 1902 have reached us. They would seem to bear out the opinion expressed that considerable ordinary Bessemer iron was used in basic open-hearth practice last year. While the increase in "Bessemer and low phosphorus" pig iron production was from 9,596,793 tons in 1901, to 10,393,168 tons in 1902, or about 800,000 tons, the increase in Bessemer steel production was 200,000 tons less than this, or from 8,713,302 tons to 9,306,471 tons.

BUSINESS METHODS IN THE NEW DEPARTMENT.

Secretary Cortelyou, of the new department of commerce and labor, and James R. Garfield, commissioner of corporations, are starting to discharge the important duties of their positions in a manner which commends itself to all except the spoilsmen. The latter evidently thought that in the creation of a new department they would find countless jobs which would be filled with more regard for the political services of the applicants than for their ability to discharge the duties of the positions to which they aspired. Secretary Cortelyou and Commissioner Garfield have announced that appointments will be made solely on a basis of merit, and the angry job hunters who went to Washington are now homeward bound filled with disgust. It would indeed have been unfortunate if the officials of the new department, which is so closely connected with the business interests of the country, had adopted a method of making appointments which would not be tolerated by any business concern in the United States in selecting its employes. The great department of commerce should be a model of excellence in its business methods.

Commissioner Garfield has announced that "people who expect a wholesale assault on the industries of the country by the bureau of corporations will be disappointed," and he adds that stringent enforcement of the law may be expected. The law, as we understand it, aims to prevent unjust discrimination on the part of railroads and other corporations and to place all men on a plane of equality of opportunity. Such a law wisely administered will have highly beneficent results and the new officials deserve the hearty support of the business community.

SOFT STEEL AND STRUCTURAL IMPORTS IN 1902.

Statistics are only now available of the imports of ordinary soft unwrought steel and of structural shapes for the calendar year 1902. In our issue of January 22, last, we gave such statistics to Sept. 30, 1902, and are now able to complete the presentation for the calendar year.

As heretofore noted, the figures given in the monthly summary, issued by the Treasury Department, do not present a picture of the movement in soft unwrought steel, and include structural material with miscellaneous iron and steel imports, so that its identity is lost. As the duty on unwrought steel varies according to the value of the steel, from one cent a pound up, and as all the soft steel, in the form of billets, sheet bars, slabs, etc., which constituted a special movement last year, was valued at less than a cent a pound, the later statistics which classify unwrought steel imports according to value, give the information which the steel trade practically desires. The presentation below eliminates the comparatively steady movement of high class steel imported for special purposes, while, as stated, it includes all ordinary soft steel.

The figures refer to "imports for consumption and withdrawals from warehouse."

Imports of soft steel ingots, blooms, slabs, billets, sheet bars, etc., all valued at one cent a pound or less, and of structural shapes, girders, columns, etc., whether fabricated or not, gross tons:

	Soft unwrought Steel.	Structural.
Fiscal year 1899	1	498
Fiscal year 1900	0	696
Fiscal year 1901	0	856
July to December, 1901	685	202
Calender year 1902	254,148	52,179
Quarters, 1902:		
First quarter	11,096	436
Second quarter	68,347	8,067
Third quarter	95,530	23,613
Fourth quarter	79,175	20,063

Examining the quarterly movement in 1902 as presented in the table we note the sharp rise in soft unwrought steel imports to a maximum in the third quarter, followed by a noticeable decline in the fourth quarter. This decline is continuing and if no other influences intervene, the imports of this class of material for the second quarter of this year will be found to be of very considerable proportions. The importation of structural material began later than that of soft steel, but appears to be declining in about the same proportion, say a drop of one-sixth from the third to the fourth quarters of last year. However, such material may be imported this year in relatively greater proportion to unwrought steel, judging from present indications in the American market.

Imports of crude steel last year appeared large simply by comparison with previous years, when such imports were practically *nil*. As a matter of fact they constituted scarcely 1 percent of the domestic production in the year. The imports of structural material constituted a somewhat greater percentage, and may have slightly exceeded 1½ percent of the domestic production. The official figures of production are not yet available in either case.

A DANIEL ON A PATENT OFFICE CASE.

The common belief that an appeal to the law is but an expensive and uncertain experiment in rewarding the right and punishing the wrongdoer has had something of a shock in a recent patent case. It was a question of originality. To whom should the benefit of the patent inure? The matter came up before Commissioner Allen on an appeal from the decision of the examiners-in-chief. The latter had reversed the decision of the examiner of interferences under which priority of invention was awarded to the first of two applicants. These applicants we may call A and B. A files his application first and the weight of this act is increased by the fact that B appears as a witness to the signature. The testimony is flatly contradictory. The two men were evidently associated but each claims that the other was merely a spectator and not a co-worker in the practical reduction of the idea to a useful form. There is, however, a difference of view at this point. A declares that B had nothing to do with the invention, except to wait upon him, to run errands and to keep intruders out of the shed where the experimenting was carried on. However, the shed belonged to B, and if any preliminary work was accomplished elsewhere it did not seem credible to the commissioner that A would move over to B's premises and use the appliances there unless he expected some benefit from the presence of the latter.

B has some awkward circumstances to explain also. The name at the foot of another's application for a patent does not imply any ownership and might fairly be taken as a disclaimer of any right whatever in the property. But B asserts that he knew nothing about the patent business and supposed that he was signing as a joint inventor; that when he learned of the true state of affairs he was diligent in asserting his claim. A insists that B never had any interest in the invention and nothing was ever paid or promised for the latter's services. The commissioner rightly points out that, accepting such statements, B's actions would be totally at variance with the ordinary rules which govern human conduct.

From a number of circumstances the commissioner holds that what A did in the shed grew out of B's conception; that granting that A's action resulted in the final reduction to practice, the act would inure to the benefit of B and that B should be held to be the original inventor. A and B were co-workers, but A denies the partnership relation so that he cannot avail himself of it. He makes no claim of joint inventorship and Commissioner Allen ruled that B was entitled to be adjudged not only the first but the sole inventor of the invention at issue.

This decision again reverses matters and it is likely that the end is not yet for the legal struggle. The result so far obtained has given the victor twice his original claim and adds new force to the adage "half a loaf is better than no bread."

PERSONAL.

James Gayley, first vice president of the United States Steel Corporation, has gone South for a stay of two weeks.

L. C. Hanna, of M. A. Hanna & Co., and E. W. Oglebay and L. B. Miller, of Oglebay, Norton & Co., Cleveland, are at Palm Beach, Fla.

F. F. Prentiss, of the Cleveland Twist Drill Co., Cleveland, has gone to Mexico for a three months stay.

Albert N. Stanton has resigned his position as vice-president and member of the board of directors of the American Tube & Stamping Co., Bridgeport, Conn.

Louis Chavanne, of the firm of Chavanne-Brün Frères, St. Chamond, Loire, France, is visiting important engineering and foundry plants in this country, devoting the past two weeks to Pittsburg and the Central West.

S. T. Wellman, president of the Wellman-Seaver-Morgan Engineering Co., closed his term of office as president of the Civil Engineers' Club of Cleveland by an address on "The Siemen's Regenerative Gas Furnace." The address was delivered at the rooms of the club on Tuesday evening, March 10, and was illustrated with numerous lantern slides. Afterwards Mr. Wellman answered a number of questions suggested by the paper and was given a cordial vote of thanks.

Col. Frank J. Hearne, formerly president of the National Tube Co., Mrs. Hearne, their son, W. L. Hearne, and W. C. Magee, vice president of the H. C. Frick Coke Co., of Pittsburg, Pa., left on an extended tour of Mexico last week.

Lee Elliott, of the Bourne-Fuller Co., Cleveland, sailed this week on a pleasure trip to Jamaica.

George Needham, of John Needham & Sons, Manchester, Eng., dealers in iron and steel, is now in this country. He visited Cleveland and Pittsburg this week.

C. C. Bolton, of M. A. Hanna & Co., Cleveland, returned this week from a trip to California.

The Society of Electro-Chemists and Metallurgists was formed at a general meeting held on Jan. 28 at St. Ermin's Hotel, London. The following council was elected: President, J. W. Swan; vice presidents, Prof. A. Crum-Brown, Lord Kelvin, Sir Oliver T. Lodge, Ludwig Mond, Lord Rayleigh, Alexander Siemens, James Swinburne (president of Institute of Electrical Engineers). Council: George Beilby, Bertram Blount, A. G. Charleton, W. R. Cooper, Sherard Cowper-Coles, F. G. Donnan, Prof. A. K. Huntington, R. A. Lehfeldt, F. M. Perkin, W. S. Squire, O J. Steinhart. The secretary is F. S. Spiers, 82 Victoria St., London, S. W.

THE FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the Foundrymen's Association was held at the Manufacturers' Club in Philadelphia on Wednesday evening, March 4, Dr. E. E. Brown occupying the chair in the absence of the president, Thomas Devlin. The following were present:

Dr. E. E. Brown, C. R. Brown and A. D. Wallace, E. E. Brown & Son.

S. B. Gibbons and F. C. Pullman, J. Wesley Pullman.

Jas. Duffy, Marietta Hollowware & Enameling Co., Marietta, Pa.

H. P. Jackson and Jas. McAnally, Harlan & Hollingsworth Co., Wilmington, Del.

H. Clifford Mills, Schaum & Uhlinger.

H. L. Haldeman, Pulaski Iron Co.

J. Thompson, J. Thompson & Co.

J. Hy. Pepper, *The Iron Trade Review.*

J. S. Hibbs, J. W. Paxson Co.

Geo. C. Davis, Chemist.

H. O. Evans, Thos. Devlin Mfg. Co.

A. A. Miller, *Iron Age.*

Frank Crook, Jos. Dixon Crucible Co.

C. D. Matthews, Camden Iron Works.

R. Audenreid and Wm. Hanson, Pennsylvania Iron Works.

Edw. Page and H. W. Coleman, J. K. Dimmick & Co.

H. C. Matlack, Frank Samuel.

Thos. J. Kelley, Thomas, Roberts, Stevenson & Co.

W. P. Cunningham, A. & P. Roberts Co.

J. J. McCrystal, Girard Iron Works.

David Riedenauer, I. A. Sheppard & Co.

E. E. Durant, G. F. Warren Mfg. Co., New Haven, Conn.

O. J. Ward, Howe Scale Co.

Howard Evans, J. W. Paxson Co.

S. G. Flagg, Jr., Stanley G. Flagg & Co.

Geo. Benkert, Williamson Bros. Co.

The treasurer reported a balance in the treasury of $1,123.11 and all bills paid.

The Future of Pig Iron and Coke Prices.

A discussion on the topic, "Coal, Coke, Iron—Is it wise to make contracts for future deliveries at present prices?" came under the head of new business. In opening the discussion, Secretary Evans said many foundrymen were asking for information on the possibilities regarding lower prices of these commodities. Present prices for Connellsville coke, he said, seemed to be $6.75 at the ovens, and it was hard to get at that. Whether it would be advisable to place contracts at that price for delivery until July, or whether it would be best to purchase in small quantities as required, was a question of interest to all in the trade.

Stanley G. Flagg.—I see that bituminous coal has gone down from $2.50 to $2, and I think now, $1.95. That has possibly some bearing on the question.

J. Thompson.—We use coke in a somewhat limited way, but I do not think it policy to buy anything at the present time for more than immediate needs.

W. J. W. Moore.—I do not think we are going to have any cheap fuel very soon. In order to get prompt deliveries and a careful selection of coke it would be wise to make contracts now. Judging from the condition of the railroads the market is not likely to be well supplied with coke. It took recently four days for a car of coke to go from one point in Philadelphia to another.

W. Hanson.—We are like nearly everybody else—hesitating about buying.

Dr. Brown.—We use about 45 tons of coke a week, and we have found it to our advantage to contract for a year. We are paying $5 a ton at the ovens. We felt that it was a safe thing to do. It is 72-hour coke we use.

H. O. Evans.—There has been a lot of very poor stock coming into the market for some time, but I notice it is getting a little better now.

W. J. W. Moore.—As far as iron is concerned the prices of standard brands are maintained. The furnaces are behind in their deliveries, even though trying to do all they can. They are getting down to the question of fuel, and I do not see much relief likely to come. As the season advances a lot of cars will be taken for grain shipment and further trouble will ensue. Deliveries at the present time are freer than they have been. Furnaces are pretty well sold up until July, so there is not much likelihood of price cutting. Recently some large sales have been made to big interests—people who would not come into the market if they thought there was a possibility of a drop in prices. It is only a question of time when all the good brands of iron will be absorbed.

Mr. Haldeman.—I think it is advisable for anyone who has sold his product to cover for his requirements in all these commodities. It is not so much a question of price as the ability to get the material. Until the railroads are in such a position that they can transport material there is going to be an abnormal scarcity. Today we are sold ahead six months. You will find that you will have to pay today's prices for six months. There is a little weakness, it is true, in coal, but it is accounted for. A great many people are shipping coal to get the high prices. It would not be fair to count on today's prices. On April 1 new prices will be fixed and there will be an agreement in all the regions, when you will find there will not be any cutting as before, as the new influences will correct that and see that no more shipments are made than can be used. As far as iron goes, people have been thinking that because of high prices there is bound to be a drop; but it is already found that only about 20 percent of the iron required for use has been purchased. Large buyers now are covering and those who do not cover may have to pay higher prices. The trouble is that railroads cannot haul the freight, and while this condition exists there may be a difficulty for consumers to get their wants.

A paper was next read by Dr. Moldenke, secretary of the American Foundrymen's Association, on "The Future of the Foundry Industry." It appears elsewhere in this issue.

Discussion.

Stanley G. Flagg.—I was surprised at what the Doctor said about the eight-hour day and the idea of working in three shifts. We have had some experience in that direction, although I have heard people say it could not be done. I do not think he exaggerates at all when he says it is not only possible but desirable. I believe the gradual increase of our plants and investments may bring serious conditions when we cannot get business. I have felt that when an increased output is desired it should come through different management, different methods in handling iron and so forth, all tending to double up with little more than an increase in the payroll. If in time business did not warrant a continuance the payroll could then be again cut down. Our work being mostly small, the question of two men working on one job never comes up; but I should say that as two men work on one job in the same turn there appears to be no reason why they should not do the same on two turns. We have thought that we made more scrap at night than on day work, but that was due to the fact that the night shift was generally longer than the day shift, and we did not have the best illumination. I feel sure that a plant properly laid out could be run along the lines suggested in the paper.

H. O. Evans.—I agree with the Doctor in what he says as to the possibility of a three-turn day. I have kept track somewhat of the theory of a continuous running of a foundry and see no reason why foundries could not adopt it.

Dr. Moldenke.—In speaking of the three-shift arrangement I have in mind that the claim for the eight-hour day is that a man wants some time with his family. The second shift could stop at 12 o'clock midnight, and the other come on at 7 o'clock. If these shifts were changed over every two or three weeks a man could get some leisure during daylight. Under arrangements of this kind when hard times come their plants will not have increased in size.

Dr. Brown.—I would like to ask Dr. Moldenke what he means by Russia being our chief competitor?

Dr. Moldenke.—I say our greatest future competitor will be Russia. It is a matter of race. I have been in contact with a good many Russians and the impression I have formed is that they are peculiar people. They will spend any amount of money to see results come 300 years from now. They have sent their engineers everywhere to find out what is going on. In their industrial conditions they get all they can from the foreigners and then drive them out. The only way Russia can get money is to establish industries, and she is doing everything possible to encourage them. In Germany the unions are getting so powerful that conditions there will soon be the same as in England now.

LAKE SUPERIOR IRON MINES.

The Minnesota Iron Co. (U. S. Steel) has been exploring the s ½ of the new ¼ of section 4 T 58 R 17, and has found ore. The company has let a contract for 500,000 cubic yards to the Richards-Lundeen Co. for stripping the property, and preliminary work is already under way. A steam shovel will be there this month. The contracting company is successor to Halvorsen, Richards & Co., who have done considerable work of the kind, and several Mesabi range contracts. The new mine is to be called the Higgins, for the original fee owner. It came into the possession of the Minnesota Iron Co. through the Rockefeller company, which had purchased the stock of the Rouchleau-Ray Iron Land Co., owner of the lease. It joins the east side of the Sauntry and the south of the Minorca, of the Lackawanna Steel Co., and is one forty north from the Lincoln, of the Jones & Laughlin Steel Co.

W. C. Yawkey and M. L. Fay have explored and will open a forty lying northeast of the Higgins, which they call the Tesora mine. They have a small but good grade ore body there. The land is held by Mr. Yawkey in fee.

The Union mine, owned by the American Steel Hoop Co. and the Republic Iron & Steel Co., has closed down and will be shut for some time. The Union closes with 60,000 tons in stock, which will be shipped the coming season. The Republic's Bessemer shaft, adjoining Franklin, will be reopened this spring and Franklin is now running double shift, men from Union having been taken there. Franklin will have about 110,000 tons in stock at the opening of navigation. Victoria, the third of the Republic group, is idle and has a large old stockpile on hand.

Three diamond drills are now at work in one forty acre tract of Section 30, Vermillion range.

A good deal of criticism is now being indulged in about the upper end of the lake region, of the work of geologists, largely for the real purpose of bolstering up supposed new finds of ore where geological conditions do not admit of their existence. Most of these criticisms are the result of ignorance, on the part of those making them, of what the geological theories were. Finds that have been made in section 4 T 58 R 5, cited as instances, are in no sense outside the geological limit of possible ores, and statements that are currently printed as to finds in section 4 T 58 R 16, are simply incorrect.

Stockpiles on all ranges are very large, more than has ever been accumulated in a single winter's work.

The Duluth & Iron Range road will probably erect at its Two Harbors docks a large ore crusher, to replace crushers at mines and concentrate the work at one point. This is in line with the construction of a large crusher at Escanaba, now under way.

Numerous master mechanics and head machinists from various mines of the Minnesota and Oliver Iron Mining companies, are now at Hibbing to assist in the removal of the Penobscot pumping plant. A dam has been built 100 feet above the pump station, which is 300 feet down, and the pumps will be taken out as rapidly as possible. The plant will be installed on the Menominee range.

The new Stephens mine of the Minnesota Iron Co., on which preparations for mining have been under way for two years, will make a very important shipper this season.

A fine large and well equipped machine shop is being built at the Mountain Iron mine, sufficient to care for any breakage to locomotives and steam shovels.

At the hard ore mines of the Minnesota Iron Co., at Soudan, Vermillion range, a larger stockpile is being accumulated than for many a year. There are now 100,000 tons of this winter's product in pile, with 75,000 tons left over from last year, and there will be 215,000 tons on hand May 1. The monthly hoist is 22,000 tons. About 600 men are employed at the mines. All winter a large crew has been at work from No. 8 shaft on the 13th level drifting to a large ore lens that had been found by diamond drilling. The ore was reached last week, 700 feet in from the shaft, and is now being opened into. There is a very considerable tonnage of excellent ore there. A large new pocket is being put in at No. 8. No. 9 shaft, which has been idle since 1891, has now been reopened and about 40 cars of ore are hoisted daily. The deposit near this shaft was supposed to have been worked out, but a new lens has been recently found. No drills are being worked underground this year and no attempt is being made to thus increase the tonnage in sight. The company is supervising the exploration at Armstrong lake, where two drills are working in the ne ¼ of section 14 T 62 R 14, and one drill is at Five-mile lake, section 19, T 62 R 14. It is currently reported that the exploration at Armstrong is very satisfactory. The Minnesota shipped last year 216,000 tons, and will this year considerably increase this amount, probably by at least 100,000 tons. Its poorest year was 1901, when 208,000 tons were mined, and it has produced since 1884, the first season, 7,453,000 gross tons. This mine, which was the sole incentive for the construction of the Duluth & Iron Range road, is now producing only about 5 percent of that road's annual haul of ore.

Obituary.

Palmer C. Goble, chief salesman and correspondent at the Chicago office of the Jones & Laughlin Steel Co., Pittsburg, died Monday, March 2, of heart failure. He had been employed by the company 24 years. Mr. Goble was at his desk on the morning of his death and lost consciousness while going to lunch. He was removed to his home, where he died a few hours afterwards. Born in Monroe, Mich., he went to Chicago about forty years ago, securing employment with H. W. Austin, dealer in heavy hardware. He afterwards assisted in organizing the firm of Kirk, Goble & Mendson, dealers in heavy hardware, the interests of which were later absorbed by Kelley, Maus & Co. In 1879 he entered the office of the Jones & Laughlin Steel Co.

Otis T. Stantial, who was for 11 years superintendent of the Illinois Malleable Iron Co., Chicago, died on March 7 at his home. He was a graduate of the Boston School of Technology, and previous to his connection with the Illinois Malleable Iron Co. had been employed as head chemist by the Deering Harvester Co., the Crane Co. and the Illinois Steel Co. Mr. Stantial was prominent in the Western Foundrymen's Association and later was a member of the American Foundrymen's Association.

John Philbrick Laflin, who for a number of years was prominently indentified with Chicago business interests and who was for a number of years president of the East Chicago Foundry Co., died Feb. 24th at Miami, Fla., aged 45 years.

David C. Foster, who for many years had been a banker at Poughkeepsie, N. Y., and had also been connected with iron industries, died March 2, aged 94.

Official announcement is made by officers of the Core Makers' International Union that the referendum vote in their union was favorable to uniting with the Iron Molders' Union of North America. A committee of five has been appointed by each organization to arrange details of the merger.

The suggestion has been made to the officials of the St. Louis Exposition that an exhibit of metal wheels and metal wagons might be made an attractive feature of the coming fair, as representing one of the latest displacements of wood by steel. Wagon manufacturers have long been interested in the developments in metal wheels, and the more recent efforts in the production of complete metal wagons have been watched with no little interest. The wagon of the Steel Wheel & Wagon Co., of Pueblo, Col., already illustrated in these columns embodies a very creditable contribution to the solution of the steel vehicle problem.

The Locke Steel Belt Co., Bridgeport, Conn., which found its present quarters inadequate, has purchased new buildings in which the business will be conducted as soon as the new machinery can be installed. The main building is 200x60 feet, two and a half stories, and there are several smaller structures. The output will be more than doubled. The Locke chain is made of steel.

At a meeting of the common council of McKeesport, Pa., held this week, it was decided not to pay the difference between the price asked and the price offered by the United States Steel Corporation for property in that town for the erection of additions to the plant of the National Tube Co., costing $8,000,000. It is probable that the difference will be subscribed by bankers and prominent citizens of the town.

STRIKE OF STRUCTURAL IRON WORKERS.

A strike was declared this week against the American Bridge Co., and all of the work of the company has been tied up. Thus far no concessions or overtures have been made by either side and the indications are that work will not be resumed for some time. There are 1,500 men idle in New York, 800 in Pittsburg, 200 in Marietta, 100 in Toledo, 300 in Albany, 200 in Philadelphia, and several hundred in Buffalo, Syracuse and other cities. The Chicago members of the union, who are under an agreement which expires April 1, have not obeyed the strike order. An official of the American Bridge Co. has made the following statement:

"This strike has been called without our receiving any prior notice of any trouble. So far as we know the strike is in sympathy with the hoisting engineers and reports from our foremen throughout the country show that everything is tied up everywhere in the country. We have always lived up to our agreements with the men in regard to the employment of union men, but the unions have failed to supply us with union men. The question for us to decide now is whether to employ non-union men or stop work. The organization of the iron manufacturers does not contemplate any action against the interests of the men. It does not intend to cut wages or do anything unless driven to some action by the men themselves."

President Buchanan, of the International Association of Bridge and Structural Iron Workers, issued a statement in part as follows:

"The company started the fight in Buffalo by sub-letting the riveting on a job at the Lackawanna steel plant to be done by non-union men after the union men had done the difficult part of the work. The company then attempted to put non-union men to work fitting and riveting on a bridge where our members were working. The representatives of No. 6, Buffalo, requested the company to comply with the agreement by allowing members of the union to do the work. The request was disregarded by the superintendent of the company and a strike occurred there."

The statement sets forth that in Pittsburg the company put non-union men to work on "false" work, contrary to the established working rules. Other rules are alleged to have been broken in Philadelphia, New York and Albany. These grievances, he says, were referred to the international president, who was unable to secure a conference with the American Bridge Co. In conclusion, President Buchanan says: "After consulting the international executive board, I have issued an order for a general strike. It has come to the stage where we must either quit the business or fight."

In New York the workers, who are now getting 50 cents an hour for eight hours' daily work, intend to demand 56¼ cents an hour, and there is talk of a demand to make wages uniform over the country. Demands for higher wages will be made in any case. The present wages in Buffalo are 35 cents an hour; in Boston, 37½ cents; in Cleveland, 47½ cents; and in Pittsburg, 45 cents per hour.

At a meeting recently held in New York an organization to be known as the National Structural Iron Manufacturers' Association was formed for defensive purposes to deal with the International Association of Bridge and Structural Iron Workers. The growth of the latter organization during the past few years has made an organization of the manufacturers necessary and it is probable that the demands of the structural iron workers for advances amounting to at least 10 and 15 per cent on May 1 will be refused by the association. The treatment accorded some of the individual concerns in the past has not been considered entirely fair, as the structural workers have often walked out on the slightest provocation.

The Union Coal & Coke Co., of Philippi, W. Va., has been incorporated with $25,000 capital. H. I. Speilberger, A. M. Carathers, C. H. Sturgis, J. E. Love and F. O. Blue, all of Philippi, are the incorporators.

The Pennsylvania Works of the American Tin Plate Co., at New Kensington, Pa., resumed operations this week after an idleness of nearly eight months. The big demand for tin plate necessitated the resumption of operations at this plant.

EASTERN PENNSYLVANIA.

HARRISBURG, March 10.—Spring prospects are improving in this part of the State and with the coming of summer it is hoped that the fuel supply will be increased beyond all danger of suspensions. Coal is fairly plentiful, but there is still a shortage of coke and the companies having batteries of ovens under way are pushing them along as fast as possible. The Lackawanna Steel Co. will be making coke within a day or so at its Colebrook furnaces and the Pennsylvania Steel Co. has broken ground for its battery of ovens at North Lebanon, a short distance from the Lackawanna properties. The coke shortage caused much trouble in the Lebanon district in the last week of February, eight of nine furnaces being idle at one time. Five of these were Lackawanna furnaces.

The Pennsylvania Steel Co. has blown in No. 2 Steelton furnace and all of its Dauphin county furnaces are now in blast.

The Weimers, of Lebanon, sons of the founder of the Weimer Machine Works, have become interested in a plan to establish a large works at Hebron, near Lebanon. They will engage in the manufacture of machinery.

The Dauphin Bridge & Construction Co.'s works near Harrisburg were destroyed by fire on March 6, with loss of $50,000. The company was just about ending a receivership and the fire delays some work for League Island Navy Yard and on several important contracts in Harrisburg, notably the additional flanging plant of the Central Iron & Steel Co. and the new building of the Harrisburg Mfg. & Boiler Co., which, by the way was greatly damaged by fire last month.

The Lucknow Iron & Steel Co. has started its works at Pine Iron Works. The works in this city are also running.

Ellis & Lessig have started their puddle mill at Pottstown after a suspension since last October. The works will be run on full time for a while.

The Harrisburg Foundry & Machine Works will build three 1,000-horsepower engines for the power plant of the Huntingdon, W. Va., electric railways. The company has booked numerous orders for summer delivery.

The Harrisburg Pipe & Pipe Bending Co. will build a large mill in this city for the manufacture of seamless tubes. The ground has already been broken.

The North Wales Foundry Co. has been organized to conduct a foundry at North Wales, Montgomery county. The capital is $25,000. Samuel C. Wells is prominently identified with the new concern.

After a long idleness the Ricks foundry at Reading has been started.

Representatives of the South Pittsburg Iron Works, which are to be located at Claysville, Washington county, have taken out a charter. The company will have a capital of $100,000 and the incorporators are: H. H. Miller, C. F. Dickman, W. F. Borchers, W. C. McBride, C. S. Ritchie, C. V. Harding and I. P. Miller.

The new rolling mill of the Duncannon Iron Co. will be started at an early date.

The Williamsport Clutch & Pulley Co. will be formed with $100,000 capital. The company will include the plants of the Crowell Clutch & Pulley Co., of Westfield, N. Y., and the Rundio-Bubb Co., of Williamsport. The foundry will be conducted by H. A. Bubb & Co. until May 1. The company will manufacture power transmission machinery. Several Williamsport manufacturing companies are members of the directorate.

A new plant in which J. P. Baldt, of the Penn Steel Castings works, of Chester, will be interested, will be built along the Delaware below Chester. It will have connections with various Philadelphia concerns.

The proposed combination of the book-typewriter manufacturing companies will result in enlargement of the factory of the Elliott-Hatch Co. in this city. The company has a factory employing over 300 men and it is proposed to unite it with the Fisher Book Typewriter Co., of Cleveland. The president will be John Donald Cameron, with G. F. Leganke, of Cleveland, as superintendent. The capital will be $10,000,000.

The Hodge Mfg. Co., a brass-working concern, has been formed at Greenville. The company will have $10,000 capital.

THE FUTURE OF THE FOUNDRY INDUSTRY*

BY RICHARD MOLDENKE, NEW YORK.

But little thought is given to the future of our industry in these brisk times of orders in plenty. Our plants are yet crowded to their full capacity. Enlargements have been the rule up to now, but the projection of new enterprises has practically ceased. The only possible exception being in connection with established plants. This, then, seems the time to analyze the conditions which will affect the future of the foundry industry to a greater or less extent.

In the first place we must see what currents we are running in, and how they are drifting us along. In general we may say that specialization has become the order of the day. At the present time at least three quarters of the foundry output goes into channels within fixed and narrow bounds. This condition is not only likely to continue, but will become the national trade necessity. Specialization as against generalization is the sharp contrast we note in comparing our industrial system with that of Europe. Every one following out his own line of production to the extreme, learns the fine points which enable him to undersell at a profit. With our natural resources and transportation facilities, it is easy to see that careful nursing of the foreign trade we now enjoy, should do much to mitigate the disasters of the hard times to come.

With the tendency toward standardization of everything within reach, the future seems to indicate a still firmer grip for us upon the commerce of the world, and as specialization of effort is really the cause of our world power, I cannot think otherwise than that specialization and standardization together should be the key-note of our industry for the future.

Looking over the likely condition of the money market, it seems as if competition for work will sharpen considerably. Founders who have made connections which secure them preferences in the way of holding work will be compelled to drop prices in spite of this, the outsider naturally leading the procession. Every founder will therefore try to get hold of something he can do better and cheaper than his fellow-townsman. Some will succeed in this and keep their identity intact. The stronger ones will, however, be gradually drawn into working agreements with others in their line. From this actual combination is but a short step. This tendency which has made our present time one of huge industrial combination, will be still more accentuated in the future. Self defense will compel closer business relations so far as it affects the buying of materials from the great combination of other industries, and similarly the selling to the great combinations of still other industries. With these conditions properly balanced, and sufficient "independents" to make things interesting there is not the same chance of extreme disasters in our industrial economy as heretofore.

We may therefore look for combinations in the heavy lines of foundry work, such as in car wheels, ingot molds, rolls, malleables, stoves and radiators, electrical work, and special lines of machinery. We already have working agreements, small combinations, and plans for larger ones in our industry. The tendency is therefore plain enough to see, and it will result in material changes in the actual operation of the plants.

There is a general feeling of confidence in industrial ventures, as reflected by the market for securities. Wall Street, ever discounting the future, is getting ready to list more and more industrial ventures of approved character and vast proportions, and thus facilitates the purchase and sale of securities in a bona fide way, where formerly it did so only for dynamiting purposes. While this may not be a good thing for our industry, as it usually means a lot of injected water and shaky financiering, yet it is a distinct gain to the country at large in affording wider channels for monetary interchange, and the direct necessity for capturing the foreign markets for the enormous production by capital which must earn dividends.

*Prepared for the Journal of the American Foundrymen's Association, of which Dr. Moldenke is secretary.

The result of all this is very far reaching, and is perhaps best seen in the last factor of the problem—the extreme pressure in our navy and ship building yards, and this brings us to the third item in the discussion—the labor problem. We are undoubtedly going to face serious times with our labor conditions. Were only the interests of the foundry at stake we might feel as if we are suffering for the good of the country. Unfortunately, however, the whole industrial system of the nation is bound to meet a crisis which will be delayed or hastened by conditions which may well give us grave concern. From the medieval times of the "Faustrecht" we have come to recognize that power must be made to go with responsibility. In other words, a breach of the peace, or a breach of contract is and can be properly punished in a normally constituted community. Moral wrongs, however, are perpetrated but too often, and must be met in another way.

We are daily seeing the breach between employer and employe growing wider, and this in spite of all that is done to bridge the chasm. Organizations which should naturally work in harmony are really formed to intensify the difficulty, and as between organized labor and organized capital, the crisis through which England has passed and lost its industrial supremacy, now faces us, and will next confront our chief competitor, Germany. Now what may the future have in store for us herein?

The invoking of law today, where barricades were the usual resort. The bitterness of the cry against "government by injunction" shows that the right spot has been touched. All signs point to the will of the people, that power, whether in the hands of grasping corporations, or in large groups of workingmen, shall be coupled with responsibility. Imagine an industrial association wronging any one laborer without being sharply brought to account and mulcted heavy damages, and rightly so. When, however, an employer is all but ruined by tactics which are invariably denied but are practiced just the same by individual members of labor associations, he has the choice to fight or go under. Common justice demands that the parties of both parts be held liable to damages, and be made to obey the law without discrimination. The unscrupulous employer is just as much a menace to the country as the professional labor agitator.

We will therefore see the compulsory incorporation of organizations which aim to regulate the status of labor, and thus the "right of might" will be whipped into subjection to the highest welfare of the state. This may take some time, but it is sure to come. Our national organizations of foundry capital and foundry labor—yes, even the local ones eventually will be made responsible. Injury to the vested interests of our founders as well as breach of contract with the men will be punishable, and eventually be of rare occurrence.

Then, and only then, will the real value of organized effort appear. And this is in the education of the constituent members. A labor union which instead of drawing up grievances and nominating shop committees, will teach its members to become more valuable to their employers, is a positive blessing to the country at large. An organization of employers which need not scheme how to circumvent impending demands and provide means to check violence and outrage to simple constitutional rights, would be a monument to the efficacy of our civic administration. Could the same effort and time be expended in improving conditions for labor in the foundry, another and most telling benefit would redound to our coveted permanent industrial supremacy. And I predict that all this will come, in time, for it is the consequence of enlightenment and education. Only in this way will the moral wrongs of our industrial system be righted.

This brings us to another phase of the foundry labor question, and one which is more closely identified with the actual operating, the general aspect of the labor question being rather a matter of policy and finally an added expense to the buying public. The eight hour day has long been demanded, and I predict that it will come. Whether it will bring disaster to our industry, or will find us prepared to balance matters by suitable changes in our running methods, may well be worth our careful attention.

Personally, as a trained mining engineer, I favor the eight

hour day, but we must have three of these short days in every twenty-four hours. The wise king, who held that eight hours were for work, eight for sleep, and eight for recreation, was perfectly right. It took many centuries to come near his ideal, but it will not be many more years before this is attained. However, if labor is to receive high returns for short hours, capital is no less entitled to take as heavy an income as these highly paid short hours can be made to yield. When I say that capital invested in the foundry should yield interest for 22½ hours out of the 24, nearly every foundryman will throw up his hands and say, impossible! And yet this is exactly what many of them will have to arrange for or go out of business.

Do you note the general inquiry with reference to running the cupola continuously? You may not be aware that many foundries are already running two shifts and could easily arrange for three if there were molders enough available. The arbitrary arrangement of the apprentice question is bound to take a fall in the near future, and molders, good ones and plenty, will take work where it is offered. The solution of the whole future of the foundry lies in the molding machine and men with better all around foundry education.

Probably nine founders out of ten will tell you that night work is no good. I have never found this to be the case, but always enjoyed the sight of floor upon floor of molds ready to pour the first thing in the morning. With plants as light at night as in the day time, with proper organization, and short hours instead of the usual eleven hour night shifts, wonders of work can be accomplished.

That this is not theoretical may be seen from the actual fact that in the lumber industry the night gang is always able to turn out more material than the day men, hour for hour. There is not the necessity to take in dog fights, gossiping, and the like, which is very detrimental to a continuous and strenuous output. In the mines, where it is night all the time, no difference in the rate of production is noticed, and here we find a little point which is of value to the foundry. One of the chief interferences with effective night work is the objection that molders on four or five day molding jobs have to letting others continue their operations. Suppose now, that the half dozen men who would be involved were given a contract to turn out the job properly, this difficulty would fall away at once, for no one has yet seen competent and friendly molders refuse to pound the sand together on the same mold. This is what we find in the mines. The particular stope may have two or three parties of men at work at the same time alternately. At a stated period their stope is measured up by the captain or engineer and a lump sum, as per contract, is handed out.

Why can this not be arranged for in the foundry? Does it come under the ban of piece work? If so, the sooner it is straightened out the better, and many a foundry can turn out fifty percent more work for the same floor space. The only other objection of account we meet—that molders want to pour their own molds—is cared for by continuous pouring.

Now I predict that something along these lines will come sooner or later, and if the foundry industry, which is looking very closely into the recent experiments with double turns, is sufficiently alert, the coming eight hour day need not be feared very much.

In concluding the labor question mentioned, I cannot refrain from adding a few remarks on the industrial capacity of the country at large, and the foundry in particular. We only build immense plants. We are enlarging the old ones to an extent which really means further immense plants. We have them full today, and nearly deserted tomorrow. This is not political economy, and means that when the hard times do hit us, that we take work at less than cost, to keep up our organizations. Many a nice fat surplus is wiped out in the hard times. This is not right, and perhaps the three eight-hour-shifts mentioned above may help to solve the difficulty in a measure, for a smaller plant will do for the normal output, a tightening up of conditions is met with cutting out one shift, and hard times with one turn, or even less, at work, where otherwise a vast establishment will run short handed three days a week.

Already we have some 9½ hours only of the 24 put in at actual production, the balance of the day sees the machinery idle, while the company's notes are piling up interest. With the eight hour day things will be worse unless steps such as I have indicated are resorted to. We would therefore see a plant necessarily three times as great in the lay-out as need be, and practically three times the capital tied up in it, two thirds of which is doing nothing, in fact costing interest. What could not be done with this vast amount to enrich our great nation still further?

As we look over our shipping blotters and note the effect of a holiday on the month's sales, we wish there were none of them. The same may be said for many of our men in the shops. Of course, I do not mean to advocate the abolition of our holidays, but I wish to point out what it means to have many of them when taken in connection with the size and cost of a plant for a given production or tonnage per year. We can thank our stars that our most dreaded competitor of the yet distant future—Russia—has some fifty holidays in addition to ours, which means a correspondingly increased capitalization and working cost when compared with ours. No wonder that it is only a question of time when American enterprises there sell out to the natives or come home.

In this aspect, perhaps, we find also a reason for consolidations, as the ultimate destination of many of the plans thus absorbed is the scrap pile. It will pay us to watch developments in the way of "over-capacity" very closely, and the future may have many strange developments in store for us herein.

Perhaps the last thing to touch upon, and yet the one matter which we will meet first, is the future development of the foundry equipment. This would form a topic upon which discussions may be held by the hour. Suffice it to point out two things—the molding machine and conveyors. Every thing else, as well as these, is wrapped up in the policy the foundry will be forced to adopt in the near future. I have outlined this policy, as I see it, in what has gone before, and need therefore add but little. Specialization means the molding machine with a vengeance. Consolidation gives the sinews of war to adapt, adopt, and force their systematic use. The breaking up of restrictions regarding apprentices means more and better men to do the other molding. Conveying systems mean the systematic production of castings, outside of the molding end, at minimum cost. Continuous molding, pouring, and in fact continuous work in the foundry based upon short hours with good pay, means getting the best efforts of the men, contented men, and a prosperous country. Naturally the study of the foundry in all its details will not cease. Standardization, improved work, uniform customs, we might say—the millennium, minus the human end, which we will never fully control or correct; all things which help to make foundrymen reasonably content with their life work—all this lies in the future for us.

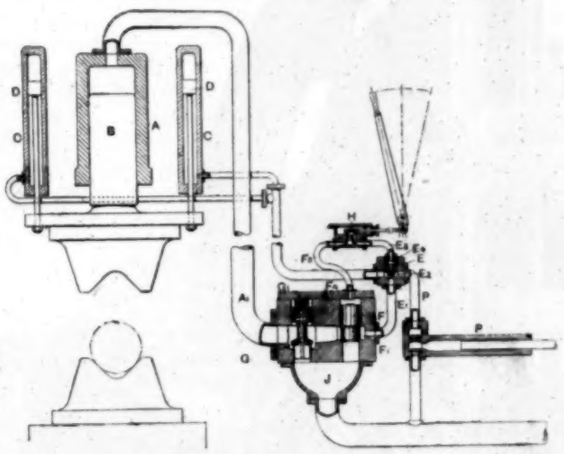
But we must not be idle in the meantime. If long association with the labor end of the foundry as well as the financial, counts for anything, I feel that we must do our utmost to place within reach of the youngest apprentice the means by which he can receive a good general education as also the special one for his trade. We owe this to our nation as well as to the industry that has made our fortunes. With all the difficulties that loom up in the labor problem, I feel that we have nothing to fear from the man who from his youth is looking forward to his own home, his savings account, the education of his children as useful citizens, and his peaceful retirement when old age comes on. This man, the back bone of the nation, has had no difficulty to realize his ambition heretofore, and will not have it in the future, as consolidations, instead of cutting him out from opportunities, will give him the chance to become a stock-holder if he desires, and by reducing the severity of hard times, keep him in steadier employment. Men of this stamp, I am glad to say, are still the vast majority of the laboring men of today. Let us help them to help themselves by education, and the future of the foundry need give us no concern.

The Connecticut Tool Co., Bridgeport, Conn., recently incorporated, is installing machinery and expects to turn out its first product, adjustable stocks and dies, in six or eight weeks.

HYDRAULIC FORGING PRESS.

The hydraulic forging press shown in the accompanying cut has been designed by Davy Bros. and Edward Crowe, of Park Ironworks, Sheffield, Eng., with a view to effect economy in time and power, and so increase the efficiency and speed of working the press mainly by enabling the descent of the press head onto its work to be effected quickly without pumping, and the power of the pumps to be brought into action automatically for the purpose of causing the further movement of the press head to be performed under the power of the pumps immediately the press head encounters the resistance due to the presence of the work beneath the tool.

The press comprises a main cylinder A and ram B for imparting the working stroke, and lifting cylinders C and pistons D for imparting the return stroke of the press head. The supply from the pumps P to the main cylinder A is under the control of a high-pressure distribution valve E, whilst the exhaust from the main cylinder is under the control of an exhause valve F, the connection of the lifting cylinders C with the main cylinder A for the passage of water from the one to the other during the descent of the main ram being also under the control of the high-pressure distribution valve E, whilst the connection of the main cylinder A with the exhaust for the admission of water to the main cylinder during the idle part of the descent of the press head is permitted by the opening of a self-closing suction valve G, which controls a by-pass connection with the exhaust and permits of flow in one direction only when the exhaust valve F is closed. The upper end



HYDRAULIC FORGING PRESS.

of the main cylinder is connected by a pipe A_1 with the valve box of the valves G and F and through a constantly open annular passage F_1 around the latter valve with a pipe E_1 controlled by the high-pressure distribution valve E. The delivery pipe P from the pumps connects, through a constantly open annular passage E around valve E, with a pipe connected by branches with the lower ends of the lifting cylinders C. J is the exhaust to the tank. The high-pressure distribution valve E and exhaust valve F is operated by an auxiliary hydraulic pressure service controlled by a slide valve H operated by a hand lever, the valve H working in a valve chest in connection with the auxiliary pressure service in such manner that the pressure may be admitted to act alternatively on the upper end of valve E or valve F for the purpose of closing the one or other of those valves, or may be released therefrom. The valve H controls ports of which two are respectively connected by pipes E_2 F_2, with cylinders E_3 F_3 in which the upper ends of the valves E F (which are of larger diameters than the valves themselves) work as plungers, whilst the third port is connected to an exhaust.

The action of this arrangement is as follows: In order to lower the press head, the valve H is moved to such position that pressure will be admitted through pipe F to act on and close the exhaust valve F, and will at the same time be exhausted from pipe E_2. The high-pressure distribution valve E will thereupon be caused to open by the pressure of the water coming from the lifting cylinders and acting on the area of the valve corresponding to the difference of its two diameters. The press head will then descend by its own weight, forcing the water out of the lifting cylinders C through the pipe E_1 passage F_1 around valve F and pipe A_1 into the main press cylinder A, the further quantity of water necessary to fill that cylinder being drawn from the exhaust J through the by-pass suction valve G which is loaded by a spring G_1. On the tool carried by the press head meeting the work the valve G will immediately close, and the further motion of the press head will be due to the action of the pumps and will be continued under the pump pressure without pause, the pumps running light until the moment when the free descent of the press head is checked. To lift the press head the position of the valve H is reversed, auxiliary pressure being thus admitted above the high-pressure distribution valve E, which is thereby closed to its seat, whilst the exhaust valve F is caused (by the pressure acting on the area of that valve corresponding to the difference of its two diameters to open, whereupon the water from the pumps will flow through passage E_2 and pipe c into the lifting cylinders C and raise the press head, whilst the water from the main press cylinder A passes out through the exhaust valve F.—[Mechanical Engineer.

Effect of Titanium on Steel.

In a paper recently read before the American Institute of Mining Engineers on the "Metallurgy of Titanium," Auguste J. Rossi says: "Our tests with steel have so far been limited to crucible steels, and enough has been observed to show that the influence of titanium, introduced in steel in the metallic state, has been to increase considerably the ductility, as proved by the remarkable elongation, contraction of area and limit of elasticity observed in high carbon steels containing 1.25 percent and even 2 percent carbon. The quantity of titanium found in the steel by analysis varied from 0.89 percent and 1.01 percent to 1.10 percent. As the effect of even such small quantities as the latter one (0.10 percent) was very marked, and as, in these cases, 0.10 percent did not represent what could have been expected from the addition of the alloy, the question arises: Has not titanium an indirect action, when thus added to steel, besides a specific one?

"It has been suggested that in the same manner as manganese removes oxygen from steel in the Bessemer process, as also in the open-hearth and even in crucible steel, titanium may not only act as a deoxidizing agent, much more powerful still than manganese, but also as removing from the steel the nitrogen it undoubtedly contains, and which has an unfavorable influence on its strength. The odor of ammonia so noticeable in the open-hearth process proves the presence of nitrogen very decidedly. As is well known, titanium burns in nitrogen at 800 degrees C. with incandescence, just as iron burns in oxygen. If so, the use of the alloy, even when containing carbon, would be well indicated in the open-hearth as also in the converter, since it could be used as a recarburizer, on account of the high percentage of carbon it contains; as a deoxidizer (with or without ferro-manganese); and as a denitrogenizer, so to speak; and, in the case of small converters for steel castings, the heat of formation of titanic acid, which is much higher than that of silica, would prove of advantage in raising the temperature of the bath even were but a small percentage of titanium to remain ultimately in the finished product. If by such use open-hearth and converter steel could be so improved as to compare better as to strength with crucible steels, and the latter be also improved to the extent it appears to have been in our first tests, there would be opened for these alloys a large field of usefulness, and for titaniferous iron ores a very important application."

A. G. Hathaway, who, as announced in these columns last week, has resigned the vice-presidency of the Vulcanus Forging Co., Cleveland, has been engaged for a number of years in the railway supply business which he carried on in addition to his service to the Vulcanus company. He has now opened an agency for iron and steel and railway supplies, with headquarters at 807 Cuyahoga building, Cleveland.

Grundy Bros., Kincardine, Can., are moving their foundry plant from that place to Strathroy, Can.

THE NEW LINE OF WHITCOMB PLANERS.

Whitcomb planers have been made for many years, the manufacture indeed extends over 53 years, and one might reasonably expect that a machine of this type would have reached a stage where no radical change in construction might be introduced. Such a belief could fairly be grounded on the permanency which planer design has generally assumed in machine shop practice, but the Whitcomb Mfg. Co., of Worcester, Mass., from time to time has tried several changes in planer design and the result of these experiments extending over several years has been embodied in the line of machine tools now being placed upon the market. Some of the ideas incorporated in the line are not so novel as others, as for example the application of handles to the shipping dogs so that it is not necessary to use a wrench every time the stroke is changed. This is going back to first principles in fact and is directed at the man with the too handy monkey wrench; the handle is always in place and the strain required to hold the dog where it is set is not nearly so severe as the clumsy custom of applying the heavy wrench would suggest. There are other features of value which will be mentioned later.

Fig. 1 is a view of a 42x42-inch by 10-foot planer which exhibits the general characteristics of Whitcomb design. The bed is heavy with wide box girts at frequent intervals. The tracks are wide and carefully fitted by scraping and equipped with lubricating rolls. The table is wide, thick and heavy, with planed T-slots and holes drilled and reamed from the solid. The uprights are heavy, deep and stiff, strongly bolted to the bed and rigidly connected together at the top by a straight heavy rail of deep section.

The gears and rack are of wide face and accurately cut. The shafting is of large diameter steel with all fits carefully ground to size. The bearings are of extra length, rigidly supported and placed close to gears, and convenient means for oiling all bearings are provided. The belt shifter moves the working belt entirely off the tight pulley before beginning to move the other on. It is a very simple and effectual arrangement having the good qualities of a cam shifter and avoiding any complication frequently found in planer belt shifter mechanisms. The contrivance is not trappy and wears well.

The headwork is strong and well proportioned for range and handiness. All fits are skilfully scraped to straight edge and surface plate. The self-acting cross, vertical and angular feeds are operated by a self-relieving froction box. The head elevating screws are both right hand and supported on ball bearings. The new power head elevating device is applied to 36-inch and larger ordinary gear planers and to 30-inch and larger second belt drive machines. It is a simple device as will be seen by the engraving and requires neither extra countershaft nor constantly running belts and loose pulleys.

The second belt drive mentioned in the preceding paragraph was patented about five years ago and has been given a thorough test in the Whitcomb shops for over six years. The important features of the drive are illustrated in Fig. 2 which shows the device as applied to the 22-inch, 24-inch, 26-inch and 30-inch machines, which are typical second belt drive planers The usual set of belt driven pulleys by which the power is applied to the planer are illustrated at K and these are driven by a pair of narrow shifting belts in the ordinary manner. The common construction would now convey the power received from a high speed belt and transmit it to a shaft bearing a pinion which would be an element in a train of speed reducing gearing which would finally reach a large spur gear, the "bull" wheel, meshing into the rack on the underside of the table. The assumption has been of course that the large gear had more teeth in contact and hence would last longer and, furthermore, the large diameter would drive the rack with less of a table raising tendency than a small gear. The small gear employed on the second belt drive of the Whitcomb pattern fails in practice to have the influence feared and runs smoothly. Of course the "bull" wheel on the other hand somewhat increased the number of bearings and the friction. Fig. 2 illustrates the second belt at E running on the pulley F which is keyed to the driving pulley shaft, and upon the large pulley G which carries the pinion H. The pinion gear H engages the gear I and through it and the accompanying shaft drives the "bull' pinion J which engages the rack and drives the table.

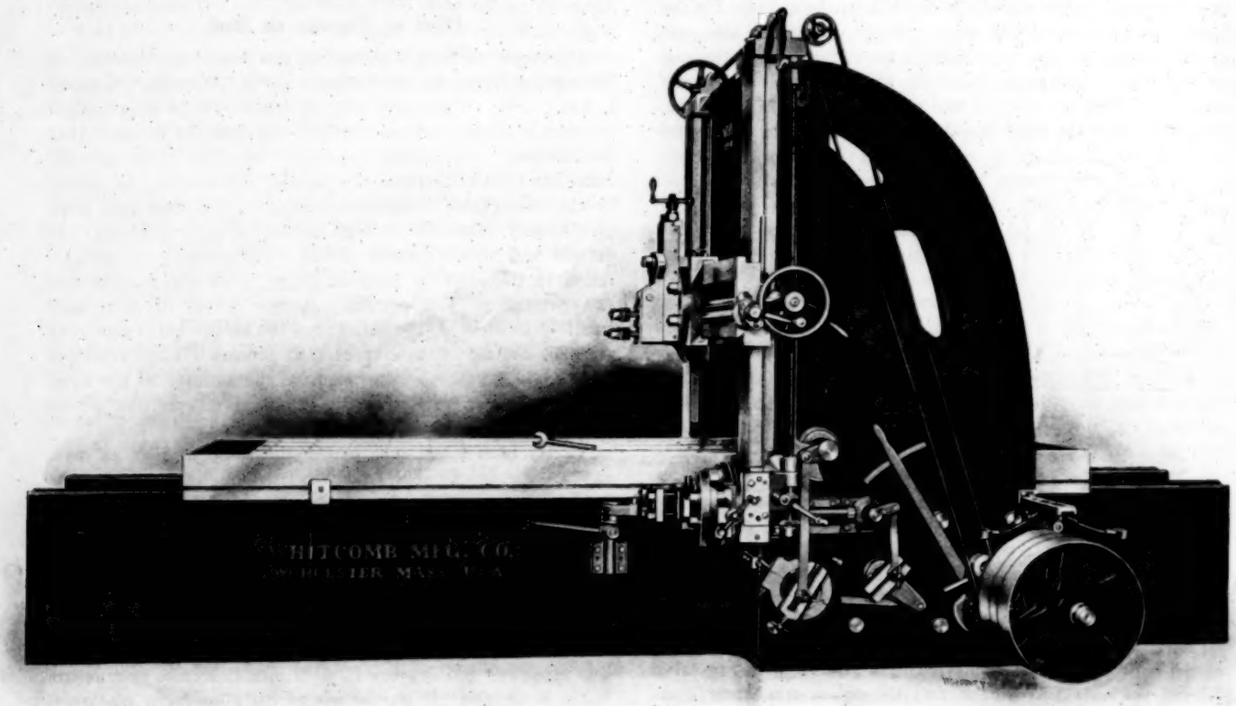


FIG. 1—A 42″ X 42″ X 10′ WHITCOMB PLANER.

The driving pulley shaft is journaled in two sliding boxes D which are geared together and controlled by the equalizing shaft C. A weight B hangs from a segment A mounted upon the equalizing shaft C and this forces the driving shaft and pulley F backward against the second belt E, thus taking up all the stretch of the second belt and keeping it at the proper tension at all times.

A 26-inch by 26-inch by 6-foot planer equipped with the second belt drive is shown in Fig. 3. The essential feature of

this drive is in the use of a comparatively wide, open belt running upon pulleys in place of the usual pair of rapidly driven gears. All gears and shafts may be removed from one of these planers in a very few minutes; there is but one gear inside the bed of these machines and this is so placed as to be free from the danger of catching chips and dirt. The two gears outside the bed are enclosed and thoroughly protected from dirt. The bushings which form the bearings for the main shaft of these planers are closely fitted into holes bored in the bed and thus form an exceedingly rigid support for this shaft and the main driving gears. The bearings are made self oiling so as to protect as far as possible this vital part

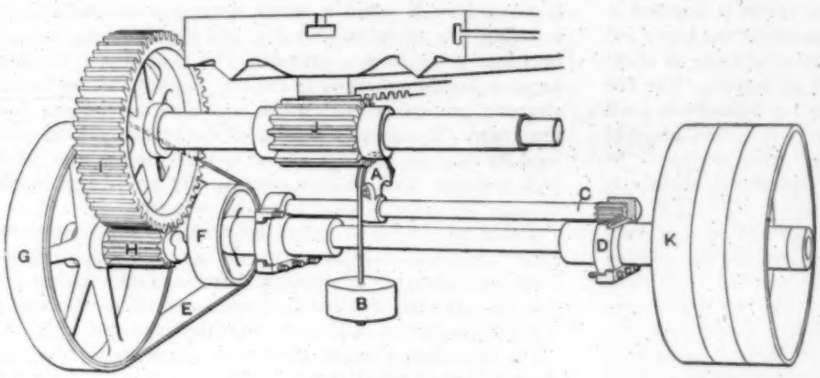


FIG. 2.—DETAILS OF SECOND BELT DRIVE.

of a planer's running gear from the possible neglect. The pulley shaft boxes are bushed with quills of genuine babbitt metal which may be replaced by new ones at very small expense if ever worn out and these also are self oiling. The second belt is shielded from machine oil from the bearings by a simple device.

The Whitcomb patent cross head fastening is illustrated in Fig. 4. This is a compound lever clamp which is operated by one motion of a lever conveniently situated at the operating end of the cross rail. There are two heavy cast iron levers, or "back straps," hinged together and hanging as nuts upon the elevating screws. The cross rail is fastened to these levers by the fulcrum screws E and located positively upon them and upon the uprights by gibs. The outer end of these levers bear upon the back of the inside lips of the housing faces and when under presure bring the cross rail forcibly against the faces of the housings. The inside ends of the levers are locked together, hinge fashion, and are free to move the required amount to and from the back of the cross rail. The roll C is carried by the pin connecting the levers together and receives the pressure of the wedge forged upon the end of th rod B which slides in a groove planed in the back of the cross rail and which is actuated by the hand lever A. The action of this clamp is as follows: When open, the hand lever A stands at an angle of about 45 degrees toward the operator, the wedge on end of the rod B is out from under the roll C and the cross rail is free to be moved up or down. Pushing the hand lever A to its upright position as shown in Fig. 4, brings the wedge under the roll C, thus forcing the ends of both levers away from the cross rail and pinching the inside lips of the housing faces between the cross rail and the outside ends of levers with great force.

ELECTRICAL EQUIPMENT IN ENGLISH IRON WORKS.

Electrical engineers are doing a rapidly increasing business in installing electrical power machinery in manufacturing establishments of England, especially in the iron and steel trades. The new machinery and electric plants of Sir B. Samuelson & Co., Ltd., are now in steady and successful operation. This company, an old and prosperous one, installed an electric transmission plant last summer, including entirely modern apparatus, both in the driving appliances and in the other machinery in its works at Newport in the outskirts of Middlesbrough, Eng. The contractors for the electrical power installations are the British Westinghouse Electric & Mfg. Co.

The power is generated in the form of three-phase alternating current by two steam-driven Westinghouse alternators of the rotating armature type. The steam engines run non-condensing, and at a normal speed of 400 revolutions per minute. Steam is supplied at a pressure of 150 pounds per square inch by four Babcock & Wilcox boilers. The boilers are heated by the waste gasses from a battery of coke ovens alongside, being placed between the ovens and a lofty smokestack. The flues are duplicated and fitted with dampers and by-passes, so that any number of the boilers may be heated and regulated as required. Steam-driven pumps supply water from the Middlesbrough and Stockton water supply system. Injectors are also fitted to each boiler, and a Berryman exhaust steam feed-water heater is included in the steam equipment.

The construction of these alternators ensures good insulation, and also renders possible the easy examination and replacing of any single armature coil without interference with the rest of the winding. The output of each generating set is 175 kilowatts at 440 volts pressure. All of the motors and the electric lighting are supplied direct from the machines. Although rated at 175 kilowatts, the alternators have a considerable overload capacity, and are able to maintain 25 percent overload for long periods and 50 percent overload for about an hour without undue heating or chance of injury of any kind. Each machine has an exciter driven by belt from the outer end of the main shaft, and the two exciters being exactly similar and of the Westinghouse multipolar type, four-pole, and each has a capacity of 7½ kilowatts at 125 volts when running at a speed of 775 revolutions per minute. Each of

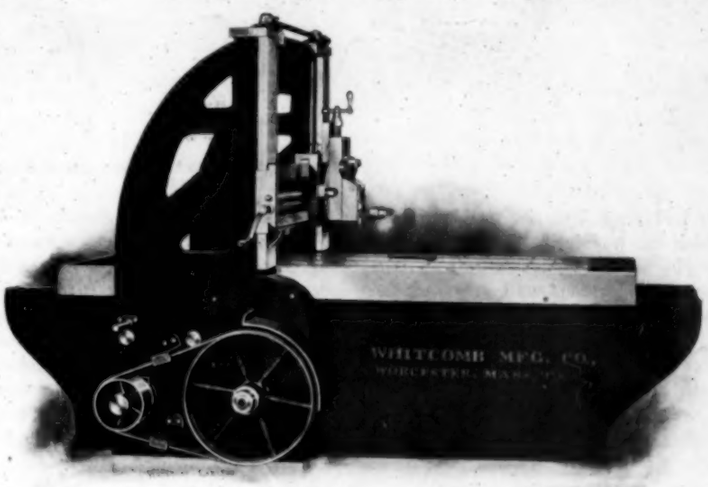


FIG. 3.—REAR VIEW OF 26″ X 26″ X 4′ SECOND BELT DRIVE PLANER.

these machines is capable of providing full exciting current for both alternators running at maximum rated load. The main switch board consists of six white marble panels supported on wrought iron framework at a distance of five feet from the engine room wall. There are two machine panels, one exciter panel and three feeder panels, all being fitted with the well known type of instruments, switches, etc., that are usual in standard Westinghouse practice. The machine main circuits and also the feeders of each of the four sets are fitted

with fuses. Each of the three feeder panels carries switches and fuse blocks for two sets, one feeder panel thus being available for extensions. The circuits are arranged for the parallel running of the main generators, which, with their exciters and switchboard, are housed in a new building erected for the purpose.

Electric power is used for the rapid handling and breaking of the coal, two motors being installed in the building set up for the accommodation of the coal breaker and elevator gear, these two machines working together and taking complete charge of the coal supply, reducing the labor item to a minimum. The capacity of this portion of the equipment is 50 tons of coal per hour. Another electric motor is installed in a shed at the base of the middle storage bin at the lower end of a conveyor belt which carries the coal at the rate of about 25 to 30 tons per hour up an angle of 17 degrees. The fine coal is fed into the coke ovens through top doors from small wagons having collapsible bottoms so as to permit of rapid work in charging. The coke is taken from the ovens by means of an electric ram, through a vertical sliding door at each end of the ovens.

An electrically operated overhead crane of 70 feet span travels over the full length of the casting bed and has a lifting capacity of four tons, the power being received from three independent motors, giving a speed of 320 feet per minute. This crane lifts the cold pigs in "comb" pieces of two tons or more in weight direct from the casting bed, and carries them to an ingenious breaking machine installed on a raised brick platform. The pigs as brought forward by the crane are laid on a long iron table which has a loose centre to which an undulating motion is given for lifting the long "comb" of the pig forward as it comes under a set of rams. Two rams descend and grip the outer sides of the pig by pressing it down on to the solid table, a middle ram follows, striking the hollow centre of the pig and breaking it into three or four pieces. The pigs are broken into lengths of about two feet each and fall down a short open shoot into railway cars below. The breaking process and the wagon loading is continuous and automatic. Another ram behind those mentioned serves to break the sow piece as it gradually works its way forward from the gripping ram of that side. All the motions of this machine, both those of the tables and the rams, are produced by a single electric motor, which is coupled to the breaker through spur reduction gearing.

The nine electric motors for the purposes described are all exactly similar in construction, and have behaved well under unusually trying conditions. They are three-phase, alternating-current, induction motors, of the Westinghouse type "C" form. With the exception of the three crane motors, which require to have a certain amount of regulation, the motors are each started by means of a double-throw switch, which may be some distance from the motor if desired.

The crane motors are started and regulated by means of Westinghouse commutator type controllers. The set of these, for all three motors, is fixed in the operator's cage, which is suspended from the crane girders at the pig-breaker end, where the man in charge is in the most advantageous position for performing his work of laying pigs quickly and correctly on the breaker table. The controllers are simply designed on an extension of the principle of the starting switch mentioned, having a number of intermediate contacts for supplying various electrical pressures to the motors.

The motor standing at the foot of the fine-coal storage bin works constantly in an atmosphere charged with coal dust, frequently being embedded in an accumulation of fine coal, and when it is cleaned out periodically a large quantity of coal is taken from it. Still it works constantly and well, never receiving any attention beyond a periodical cleaning and an occasional visit from a greaser. The two motors installed together for the operation of the coal breaker and the bucket elevators are subject to similar conditions as the one just mentioned, although to a somewhat less degree. The motors working the coke rams are subject to high temperatures. The heat radiating from an open oven is very great, even at the distance the motor is away from the oven face.

The power station is lighted by a number of incandescent lamps arranged in pairs across the 440-volt supply mains. There are, also, 120 incandescent lamps and 12 arc lamps of the enclosed type distributed in various parts of the works. The lighting system is about to be extended considerably.

The immediate effect of the electric crane and breaker for the handling of metal at the casting beds was the reduction of the staff to the extent of 23 men. The introduction of electrically-driven machinery has not necessitated the employment of new and highly trained workmen. With the exception of the power station, where the steam plant and the control of the generators and circuits call for a certain amount of skilled labor, no work of attendance beyond the ability of the untrained man of ordinary intelligence is required. The men in charge of the electric plant have been drawn from the former staff.

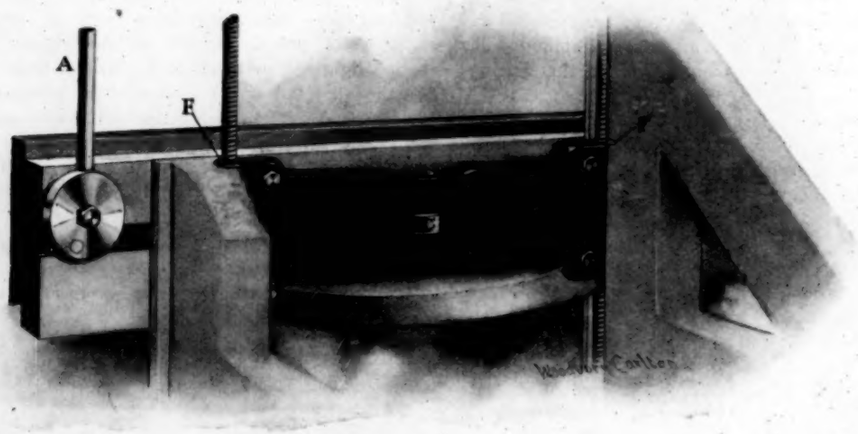


FIG. 4.—THE WHITCOMB PATENT CROSS HEAD FASTENING.

Passaic Steel Co.'s Plans.

The Passaic Steel Co., Paterson, N. J., has plans prepared for a new steel plant at that place in connection with its present plant. The plans call for twelve 50-ton open-hearth furnaces, a blooming mill, a finishing structural mill with the necessary gas producers, coal storage plant, boiler house and power plant, with a total capacity of 300,000 tons per annum of finished structural steel shapes. For the present the company intends to build only two furnaces to be ready for operation July 1 of this year, with such plant in connection therewith as is necessary, for all of which the contracts have been let and the work is now underway. The company also has in contemplation the removal of its present bridge shops to a new location and the construction of a modern bridge shop plant with a capacity of 3,000 tons per month.

FLUE DIRT AND TOP PRESSURE IN IRON BLAST FURNACES*

BY LOUIS GRAMMER, BALTIMORE, MD.

The following study of flue dirt and the influences controlling it may be interesting to many. It is published because it represents observations at about 30 furnaces at different times. It may assist in giving an impetus to the making of similar observations elsewhere. Until ten years ago, the metallic waste in furnace gases was not considered a problem of pressing urgency in iron metallurgy—certainly not in the blast furnace end of it. Many plants at present ignore, or pay but little attention to, top pressures. Prior to the introduction of Mesabi ore, the losses in escaping gases, if considered at all were regarded as thermal losses, or losses of fuel (except by those interested in lead, zinc, silver, etc). In a high-priced material like ferro-manganese, such losses were indeed considered important. But the behavior of the Mesabi ores, coming, as they did, in practically inexhaustible quantities, could not be disregarded by the furnaceman. These ores came to stay.

The tables appended below have purposely been altered to disguise the plant, the company and the ores used. The comparative values are maintained. In these tables the influencing elements and conditions which are constant, or practically so, namely, size of furnace, quantity of wind, fuel used, etc., are not mentioned. The figures represent observations consistently followed up for a long period. The weights of flue dirt were obtained from cars on which no other dirt was thrown. The analyses and calculations are based on the best of sampling. The effects of slips are excluded. Slips should not occur at well-regulated or properly-constructed furnaces, excepting under unusual and rare conditions. Allowances are made for moisture, scrap charged and silicon in the metal. The cutting effect of Mesabi ore on brick work and valve seats, its desirable percentage and its dirtying effect on stoves, are not considered here, though closely related to the topic of the paper.

I regret being unable to include figures showing efficiency of gas-washers and briquetting appliances. Scale, rightly or wrongly, has been considered as a Mesabi ore in stating the percentages of Mesabis used.

TABLE NO. 1.

Period.	Percent Fine Ore.	Blast Pressure.	Furnace.	Volume of Wind
14 days	34.5	11.1 lbs.	A	Constant.
16 days	17.6	9.6 lbs.	A	Constant.

The above represents an average for each hour through the periods named. It shows an exceptionally large increase in pressure for so slight an increase in the amount of fine ore used in the charge. Some difference in blast pressure would be expected when fine ores are used, for the interstices are smaller and the friction is therefore gerater. A change of less than an inch in the diameter of the tuyeres frequently increases the blast pressure a pound. In this case the furnace was not very well equipped for fine ores and it was very difficult to make the same number of revolutions against augmented blast pressure. Data might be quoted to show that fine ores demand stronger engines and better steam economies, unless the furnace is specially designed for their use.

Table 2 shows how much more important flue waste became upon the advent of Mesabi ores. The losses of C, D and E are small compared to many. The charge contained in the neighborhood of 25 percent of Mesabi ore. These figures only include the coarser particles caught in dust-catcher, and not that which goes to the boiler and stove flues, up the stack, or out the bleeder and explosion doors. F is a furnace using much more wind. For A and B, the percent of iron in the dust varied between 28 and 34. For the others, between 45 and 57 percent. A and B used no Mesabi ore or scale.

*Read at the Albany meeting (February, 1903), of the American Institute of Mining Engineers.

TABLE NO. 2.

Ore.	Furnace.	Average Weight Downcome Dust Deposited Daily in Dust-Catcher.	Period.	Remarks.
Lump	A	4,204 lbs.	One week	A and B used about three-quarters as much wind as C, D and E.
Lump	B	3,900 lbs.	5 days	
Partially Mesabi	C	23,960 lbs.	30 days	
Partially Mesabi	D	9,632 lbs.	30 days	
Partially Mesabi	E	29,344 lbs.	30 days	
Partially Mesabi	F	67,200 lbs.	30 days	

TABLE NO. 3.

Showing in Percent the Relative Amount of Dust Caught in Each Compartment During a Period of Four Months.

Month.	Sept.	Oct.	Nov.	Dec.	Average Percent. Dust Weighed From Each Place.
	Percent.	Percent.	Percent.	Percent.	Percent.
Furnace V:					
Dust-catcher	75.7	80.2	82.3	78.2	74.1
Boiler-house main	19.1	11.8	11.0	15.0	19.2
Stove main....	5.2	7.9	6.6	6.8	6.7
Furnace X:					
Dust-catcher	70.3	62.5	66.2	43.9	60.7
Boiler-house main	18.7	26.9	21.1	37.8	26.1
Stove main.....	10.9	11.4	12.4	18.3	13.2
Furnace Y:					
Dust-catcher	73.4	75.8	88.1	66.5	74.7
Boiler-house main	18.4	18.3	9.4	29.0	18.8
Stove main.....	8.1	5.9	7.3	4.5	6.5
Furnace F:					
Dust-catcher	63.7	62.2	73.3	79.3	69.6
Boiler-house main	23.9	22.1	17.1	14.2	19.3
Stove main.....	12.4	16.5	9.1	6.5	11.1

Final average: 69.8 percent of the dust obtained was from dust-catcher; 20.8 percent from boiler and flues; and 9.4 percent from stove flues. Variations in month and in furnace may be explained by one furnace having dirty boilers, or dirty stoves, or by working at a higher pressure and requiring more steam. The flues leading from the dust-catcher to the boilers and stoves being of equal diameter, the deposit of dust is a very fair indication of the relative quantity of gas consumed for heat, blowing engines and other power. The figures show the possibilities of a large dust-catcher, kept clean, and also show that with Lake ores in modern large furnaces about twice as much gas is used for steam as for heating the blast. More refractory ores, poorer steam economies, lower furnaces, uneconomical stoves and other considerations would affect this ratio. Many European engineers estimate 60 percent for the former and 40 for the latter.

Another record on Lake ores shows that of the dust deposited through a long period, 67.4 percent was in the dust catcher, 23.5 percent in the boiler house main, and 9.13 percent in the stoves, which would seem to indicate that less than 30 percent of the gas was used in stoves here. In the cases cited, the bleeders were closed. In plants practicing slow driving and using high blast heats, the distribution of gas dust would probably be different. It is assumed that the fine dust carried up chimneys by draught is divided in the same proportion between stoves and boilers.

TABLE NO. 4.

Furnace.	Consecutive Weeks.	Tons Ore Used.	Tons Dust Weighed.	Percent. Loss.	Condition.
V	1st	6560	415	6.33	Ore dry, natural state.
V	2d	6634	375	5.65	Water used, ore soaked.
V	3d	5307	238	4.48	Water used, ore soaked.
X	1st	6089	351	5.76	Dry ores
X	2d	5926	242	4.08	Wet ores.
X	3d	5791	138	2.38	Wet ores.

Furnaces X and V are alike in size and operation.

Table No. 4 shows, or seems to show, that wetting the ores is an assistance in preventing loss, and records kept over a very long period confirm this impression. These ores are wet after weighing. There is always a chance of error when using wet ores, particularly with mechanical devices, for the bucket does not fully empty itself, and the adhering ore decreases, by its own weight, the weight of the next charge. By using the downcome dirt a second time in a thoroughly saturated condition, some have succeeded in keeping the waste through dust, even when using 50 percent or more of Mesabi ore, down to 3 and 4 percent.

The use of fine ore and downcome dirt slackens the driving and reduces the output; hence this is not always

advisable, even considering ore economy. Before the Vaughn gun was used and when stoppages at casting time were customary, the fine downcome dust at many places was charged in the top while the blast was off.

Wetting the ore helps to make steam and assists in keeping the stoves clean. I once filled a jute-bag with 100 lbs. of flue-dirt saturated with water, and suspended it under the bell for five minutes while the blast was on. Upon pulling it up it was not thoroughly dry. If the ore was sufficiently valuable, it might be worth while to test the effect of moistened flue-dirt, but it would have to be slowly, so as not to impede rising gas currents.

TABLE NO. 5.

Furnace.	Period.	Percent. Mesabi Ore and Scrap.	Percent. Metallic Contents of Burden Lost in Dust-Catcher Dirt.
A	7 wks.	38.8	2.45
B	7 wks.	40.2	2.04
C	7 wks.	37.2	1.18
D	7 wks.	27.4	.73
			Percent. of Total Charge Lost.
L	4 wks.	62.0	5.29
L	1 wk.	55.6	2.31
M	4 wks.	74.75	5.40
M	1 wk.	75.7	6.90

For A, B, C and D the last column is obtained by dividing the total metallic contents charged into the weight of iron in the collected dust. The last column for L and M represents the loss calculated from the charge and the amount of pig-iron obtained.

TABLE NO. 5a.

Furnace.	Period.	Percent. Mesabi Ore and Scale.	Charges.	Percent. Metallic Contents Lost.	Actual Yield. Per Cent.	Material Used Per Ton Metal Produced.
A	2 wks.	50	206	9.81	53.2	1,877 ton
A	2 wks.	25	218	6.68	55.9	1,789 ton

Data of this kind could be furnished indefinitely. They are given to show that the metallic loss in dust increases with the amount of Mesabi or fine ore used. The ores were dry, no dust was recharged, and the volume of wind remained constant.

The figures for A, B, C, and D in Table No. 2. are small, because no account was taken of the dust carried up the chimneys of the stoves and boilers.

It was generally accepted in 1898 as a fair statement, that 8 to 10 percent of the Mesabi charged in the furnace was blown out again. This was for finely divided Mesabi, throwing away the dust and not wetting the ores. Before any special devices are adopted, it may assist us, in studying these losses, to think of the rising furnace gases as projecting fine ore up from the stock level in the same way that the ebullition of gas in a champagne glass throws up a spray of wine, or a spring in the mountain shows dancing sand in the bottom of its clear depths. The furnace-gas, with pressure from ¾ to 4 oz., projects particles of fine ore upward; the more fine ore there is, and the greater the volume of wind, the more fines we should expect to see thrown up. Mesabi ores will pass through finer sieves than any of the ores used in large quantities before their advent. The metallic loss through dust, when using them, is greater than with the old-range ores, unless special care is taken. It would be a valuable contribution to our knowledge if schools of technology, such as Lehigh, Case, or the Massachusetts Institute of Technology, would work up the data on this subject. They should first ascertain the fineness of different ores, and which sizes are affected by 1 oz., 2 oz., 3 oz. and 4 oz. pressures, and how far the particles are lifted. It might be of interest to fill a small model furnace with different ores, coke and stone, and note the time of passage of colored gas or water through it under a constant head or pressure. This might help to determine whether the adoption of a certain ore would increase or decrease blast-pressure. While we know there are Mesabis and Mesabis, we have not attempted to discriminate. All those here considered are in finely divided state.

In Table No. 6 three furnaces, using practically the same percentages of Mesabi, show great variations in flue-dirt losses. They are the same in size, and the data varying most markedly with tons of flue dirt collected relate to the top-pressure.

TABLE NO. 6.—*Representing a Six Weeks Run.*

Furnace.	Relative Wind-Volume.	Blast-Pressure. Lbs.	Top Gas-Pressure in Ounces.	Mesabi. Percent.	Tons Flue-Dirt Collected.
X	34.08	14.5	2.36	33.48	141
Y	34.66	15.77	2.63	32.25	181
Z	28.90	15.70	1.14	35.57	116

The following Tables (7, 7a, 7b and 7c) are given to show the top-pressures at different plants. They show that it is a study of prolific import, and that furnaces should be equipped with recording manometers on the top and on each main gas-branch, the one leading to stoves and the one leading to boilers. If such gauges would record suction as well as pressure, they would afford interesting data before an explosion. They might throw some light on "slips." If the gauges are properly located, they would certainly assist in showing, better than blast gauges do, which stoves need cleaning and which are choked by a slip.

TABLE No. 7.—*Gas-Pressure, Expressed in Inches of Water.*

Date.	Furnace.	Stoves on Gas.	Relative Wind-Volume.	East Try-Hole. Inches.	West Try- or Gauge-Hole. Inches.
Oct. 18	K	2-1-4	70	5½	5½
Oct. 19	K	2-1-4	86	7½	9¼
Oct. 20	K	2-1-4	76	9	10¼
Oct. 20	K	1-2-3	76	11	12
Dec. 3	K	1-2-3	76	14	12
Jan. 3	K	?	80	8¾	8

Top gas-pressures as high as these show throttling, inadequate gas main areas, or choked checkers in the stoves. This particular furnace was receiving more wind than her mains were designed to carry. Such conditions result in leaky bells; and that, with the relative hot tops which furnaces have with some ores, means frequent changes of the bells. Table 7 shows either that the combustion chamber was clinkered, or that the checkers were choked with dirt on stoves 1, 2, 3, which recorded higher gas pressures than when gas went through 2, 1, 4. It may show that the hot-blast man did not open his valves wide enough. In this particular instance the gas-valves were mushroom valves enclosed, so that the gas was forced into the stoves and not brought in by suction to the extent necessary with Spearman burners. Such a recording manometer might show when the hot-blast man opened his valves too little (if that ever occurs). It might show which leg had the greater pressure, the boiler- or stove-leg. Whatever the pressure at the furnacetop is, the pressure at the entrance to the burners is influenced by the draft of the chimneys of the stoves and boilers.

It will be noted that top-pressures are influenced by wind volume. It is suggestive that if Table 6 is correct, then furnaces making ferro-manganese and spiegel should have their top-pressures closely watched, for the loss of such expensive ores through the top is greater, in many instances, than through the slag.

TABLE NO. 7a.

Date.	Furnaces.	Stoves on Gas.	Relative Wind-Volume.	Gauge-Holes. Pressure in Inches of Water.			
				No. 1.	No. 2.	No. 3.	No. 4
Oct. 18	L	1-2-4	76	4⅛	2⅞	4⅛	4⅛
Oct. 20	L	1-3-4	88	9⅛	9	9¼	9¼
Oct. 22	L	1-2-3	80	7½	7	8¼	8
Oct. 23	L	2-3-4	96	8¾	8¼	8¾	8½
Oct. 26	L	1-2-3	92	8½	8½	8½	8½

Here (Table 7a) the gas valves were of the Spearman-Kennedy type. The above furnace was shut down, the flues and stoves were cleaned, and then subjected to experiment as indicated below:

TABLE NO. 7b.

Date.	Furnaces.	Stoves on Gas.	Relative Wind-Volume.	Gauge-Holes. Pressure in Inches of Water.			
				No. 1.	No. 2.	No. 3.	No. 4.
March 16	L	?	104	3¼	2½	1½	2½
April 2	L	?	124	5	5	5	5
April 25	L	?	124	5¼	5	5	5¼

Table 7b shows that while, under similar conditions, top-pressures may vary with the volume of wind, it is not

safe to take pressure alone as an index of the velocities of gases entering the downtake. The reader will note that we have a pressure of 5 inches with 124 revolutions as against 9¾ inches with 88 revolutions, yet the volume of gas issuing from the furnace-top at 124 revolutions must be larger, hence its velocity of exit and dust-carrying power must be much greater.

These tables show that manometer records, if continuously kept, may be a guide as to certain conditions, but intermittently noticed are (like all unsystematic records) misleading. I attribute the difference in pressures at different gauge-holes partially to dirt in the try-hole, and partly, also, to its proximity to the downcome mouth.

It may not be inappropriate to mention here that the same furnace with increased top-pressure seems to drive more slowly. Three instances have come under my notice of furnaces of the same size and equipment, and similarly treated, which seemed to indicate that the furnace nearest the boiler draught-stack drove most rapidly, and that the furnace nearest the stove-stack made the best iron and its stoves gave the best heat.

Now, I do not believe theoretically, that top pressures influence driving; but, as boiler gas burners are seldom manipulated (while stove burners are often adjusted), the boiler house gas main will not infrequently have a lower gas pressure recorded on the manometer than does the stove gas main. Top-pressures, though not shown here, do influence blast pressure. I have known the cleaning of flues to reduce blast pressure two pounds. Reduced blast pressure results in less leakage and more wind enters the furnace from a given number of revolutions, more coke will be burned and the driving will be more rapid.

TABLE NO. 7c.

Date.	Furnaces on Lake Ores. Pressure in Ounces.						
	L.	M.	N.	O.	P.	Q.	R.
1st day	¾	2¼	3¾	½	1	2	1½
3d day	¼	1½	2½	¾	1¾	⅞	⅞
7th day	½	3½	4½	1	1½	1½	1½
9th day	½	2¼	4	1	1¼	1	1

Roughly speaking, for those wishing to compare Table 7c with previous records, a pressure of 1 ounce is equivalent to that of 2 inches of water.

We have now established that flue-dirt loss is influenced by the volume of wind, the dryness, fineness and quantity of fine ores, and possibly by top pressures. But after considering these influences there were losses still unexplained. In the summer of 1894 I tabulated some losses in comparison with top-dimensions, on the hypothesis that the loss varied with and proportionately to the volume of wind and the percentage of Mesabi ore used. Reducing a number of these records to a common standard, I found that the furnaces which had the smallest stock line and downtake diameters presented losses in excess of the estimated loss as calculated. Comparing more closely, the losses seemed to vary, as they should, inversely as the downtake and stock line area. Theoretically, they should vary as the squares of the areas, for the carrying power of wind varies as the square of velocity; but this is drawing the line too closely for our limited data.

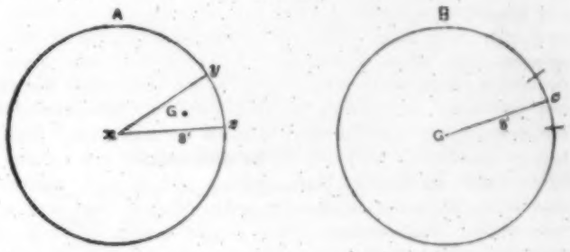
However, the matter was not so simple as we hoped. A construction in accordance with these deductions was disappointing. There are other considerations, and the knowledge must be differently applied. With a larger downtake mouth there is a greater likelihood that ore will slide from the bell into the dust catcher, unless the stock line is kept lower, or the downtake raised. This, and what I am about to say, emphasizes the need of a positive signal (such as an electric bell or a shining bulb) to show when the furnace is full. In short, an electric stock-gauge should be used, particularly with automatic tops and fine ores.

Of course, making the stock-line diameter greater would help, but this would in many cases conflict with conditions deemed necessary, as expressed in an article in *The Iron Trade Review*, Feb. 20, 1902. A poorly tapered stack causes numerous slips with Mesabi ores, and one slip may cost many dollars, as it may throw out from 10 to 120 tons of ore.

The idea of an annular ring seemed to be a good one, as it does away with the objection of one large opening, and conduces to a product of regular quality and to low fuel consumption. This ring should be situated high up. Indeed, the mouth of the bottom downcome should be at least 6 (and better 8) feet above the level of the drop-position of the bell. Many openings, though of greater area and producing a lower exit-velocity of gas, may cause greater loss of dust, if situated lower.

For example take two furnaces, A and B, each with a stock-line of 16 feet; A, with an annular opening, has a downcome area of 50, and B of 25 (these are entirely relative units); then the velocity of gases from A would be expressed by 2 V, while the velocity from B would be 4V. Compare two circles, A and B. A has continuous downcome area. It is an annular opening. B has an opening at *c*. The velocity in A=2V, and the velocity in B=4V. Assuming that the sector *x y z* in A, to be a triangle, the center of gravity of the area influenced by the suction of the downtake is at G, ⅓ of the radius, or 2.66 feet, from the arc *y z*.

FIG. 1.



In B, the average particle of dust travels the distance of the center of gravity (G) from the mouth (*c*), or 8 feet, which is the radius of the stock-line. If the carrying power varies as the square of the velocity, then the relative loss of dust in two furnaces so constructed would be for A, $\frac{2.66}{4} = .666$; and for B, $\frac{8}{16} = .50$. Or A would throw over $\frac{.666}{.500} = 1.33$ times as much.

So, unless numerous or continuous openings are situated high up, numerous or continuous openings of even larger combined area will frequently cause greater loss, because a larger dust area will frequently cause greater loss, because a larger dust area is influenced by the mouth's suction. In trying to avoid flue dirt loss, some tops designed in the past five years have interfered with good distribution, and that is of immense importance, even with Lake ores. Of late, this fact has been too often forgotten.

In a downtake, going out (as it should) at the top in the center where a double bell is used, the law of inverse areas and loss of dirt would hold. The fineness of each ore should also be determined, and its elevation of projection under pressures from 1 ounce to 4 ounces ascertained. This law would hold in an annular ring if the opening were high enough, and this is the preferable location of exit with automatic fillers. A few mistakes are quite frequently made in automatic tops. The stock line is sometimes carried half-way up the downcome opening. In such cases there results either a rolling of ore down the downtake by gravity, or a throttling of the exit area in those furnaces where the downtake is horizontal for some distance before dropping. This loss ver·· frequently occurs in starting up with inexperienced top-fillers who are afraid to go near the furnace, which is slipping, as most of the modern, high, automatically filled furnaces do.

The tables in this paper are but samples of data that might be obtained. The flow of furnace-gases is a problem requiring formulæ somewhat resembling those which men of nimble minds like to evolve in studying the ventilation of mines. The issuing of gases from the furnace-top presents a problem with some resemblance to the problem in the jig, where the settling of material in water is influenced by size of lump, specific gravity, liquid depth, etc. The reciprocal corollary to studies of outflowing

gases in the downtake is the study of the inflowing air at the tuyeres. Some light on the multiple tuyere controversy may be gained by modifying our diagrams, but the subject is not properly treated under this monograph.

I note in Mr. T. W. Robinson's* contribution of 1888 that he advances the view that the tension of gases assists reduction. With the ores in use at that time, which were relatively lumpy,—for all old-range ores may be so regarded when compared with Mesabis—high top-pressures would not have been accompanied by so much ore loss, and it is likely that, as a reducing influence, it was of more moment than with finely divided Mesabis. The pressure Mr. Robinson used in one set of experiments was 2 lbs. to the square inch, corresponding to what we should expect to find in an 85-ft. furnace, 11 ft. down from the stockline. We can readily believe, that, as all solids have pores, pressure assists gases in entering these pores and thus contributes to more intimate contact.

I tested this idea with some Cornwall ore. A Mr. Blenkinsop, of Wales, patented a process for roasting sulphides. His idea was to cool roasted ore under high pressure. Our results showed that where we could reduce sulphur to 0.8 percent in the Gjer kiln, when cooled under 8 lbs. pressure it was reduced to 0.2 percent. But our results varied with the size and the nature of the lump—and also with blast pressure. This inclines me to the opinion that while augmented top pressures may assist reduction when using lump or old range ores, their use is not necessary with finely divided ores like Mesabis. In our endeavor to make a tapered stack we may obtain high top pressures; but they should be an incident, not an aim. With poor machinery, leaky valves and a poor master mechanic, high top pressures with Mesabi ores are a very distinct disadvantage. They should usually be avoided with fine ores, at all but the best planned and best built plants. While it is possible that the low fuel consumption, in the two furnaces quoted with the highest top pressure, may have been due to gas tension, I am more inclined to believe that the high top pressure, in augmneting the blast pressure, prevented the same amount of wind being given to the furnace. Consequently the wind it did receive was at a higher temperature.

With perfect intimacy of contact, the rapidity of solution might be said to be represented for a homogenous material by the ratio

$$\frac{0.5236\ D^3}{\pi\ D^2} \text{ or } \frac{0.5236\ D}{\pi} = T,$$

"D" being the average diameter of the particle acted on by the gas or liquid. This fraction means that as the surface exposed varies as the square of diameter and the weight as the cube, the larger a particle the more time it will take to dissolve a given unit of weight.

The more lumpy the ore, the more valuable gas tension becomes, and more time is necessary for reduction. And the converse holds: The finer the ore and more perfect the intimacy, the shorter the time of exposure that is necessary for reduction. It would therefore seem that Mesabi ores require less and not more time of exposure for reduction. The use of furnaces 100 feet high for fine ores would seem to indicate that they required more time or, at least, as much time for reduction. That high furnaces are necessary to accomplish this is questionable. In an experiment, a tin cup filled with marbles of sizes 9, 13, 19, contained, in units of marbleweight, respectively, 10, 8.75 and 7.75. An arithmetical computation shows that a cylindrical measure—56 units in diameter and 92 units deep—will contain:

Size of Marbles.	Area Surface Exposed.	Weight of Contents.
13	8.2	21.5
23	4.2	19.5

These figures are entirely comparative. I appreciate that figures given in handbooks do not bear out these relations, for they give the weight of a bushel of coal for larger sizes as being greater than for smaller sizes.

If the above reasoning hold in practice we should expect larger furnaces to be built for lump ores, and not for fine ores. But it is not to the size of the vessel in which the mixture is placed that we look for large outputs, but in intimacy of contact. It is along these lines that strides have been made. Fine ores demand more wind, as they are, let us say, more readily dissolved. We can therefore push the plant more rapidly. Large amounts of wind, to be properly used, demand fine stock; but fine stock requires more pressure, and that means that the engines and boilers must be economical.

These well known facts have been ignored of late in the pursuit of labor-saving devices and because of other and more important matters, such as facilities for obtaining coke, etc. I have purposely ignored chemical and thermal aspects.

* "The Effect of Velocity and Tension of Gases on the Reduction of Ores in the Blast Furnace," *Trans.*, A. I. M. E. xvii., p. 282.

AMERICAN RADIATOR CO.

The annual meeting of the American Radiator Co. was held March 4. In the fourth annual report to Jan. 31, 1903 the following comparison is made:

	1902	1901	Increase.
Profits	$ 701,094	$ 627,614	$ 73,480
Preferred dividend	210,000	210,000	.....
Surplus	491,094	417,614	73,480
Previous surplus	1,235,274	817,659	417,614
Total surplus	1,726,368	1,235,274	491,094

Since organization the showing:

	Net profits.	Preferred dividends.	Surplus.	P. C. on com.
1899	$657,161	$157,500	$499,662	10.2
1900	527,997	210,000	317,998	6.6
1901	627,614	210,000	417,614	8.6
1902	701,094	210,094	491,094	10.0
Totals	$2,513,868	$787,500	$1,726,368	

The balance sheet compares:

Assets.	1902	1903	Increase.
Plant, etc.	$ 6,874,174	$6,625,730	$ 48,444
Additions during year	579,788	348,443	231,345
Total	7,453,963	6,974,174	279,789
Less depreciation	100,000	100,000	.....
Report net	7,353,963	6,874,174	279,789
Cash	216,791	211,439	5,352
Notes receivable	15,010	25,073	*10,063
Accounts receivable	1,449,127	1,285,059	164,068
Raw material, supplies and finished product	1,055,253	944,318	110,935
Total quick assets	2,736,183	2,465,889	270,294
Total assets	$10,090,146	$9,340,063	$750,083
Liabilities—			
Capital stock, preferred	$ 3,000,000	$3,000,000	.....
Capital stock, common	4,893,000	4,893,000	.....
Accounts and bills payable	470,778	211,789	258,989
Surplus	1,726,368	1,235,274	491,094
Total	$10,090,146	$9,340,062	$750,083

*Decrease.

President Woolley in his annual communication to the stockholders said unprecedented prosperity has characterized the operations of the company for the year. Notwithstanding the increased cost of materials great activity prevailed in building operations, which proved a potent factor for increasing the volume of business. He reported the demand for introducing the company's products into buildings already in existence as becoming more important and formidable. A large plant has been built and equipped in Buffalo. The enlargement of the factory in France will further the company's business in that country. A large modern radiator and boiler plant in Germany, which is already in partial operation, will enable the company more promptly to supply the demands of that and other continental countries.

The report that the Olive Hill Fire Brick Co. of Wheeling, W. Va. (works at Olive Hill, Ky.), has given an option on its plant to the promoters of the new fire brick combine is an error. Efforts have been made to get the company into two combines, but without success. Recent expert examination of the Olive Hill clay properties, covering about 2,000 acres, have shown a very large body of flint clay, running in some parts 22 feet in thickness. The company is now adding improvements and will enlarge the plant to more than double the output.

BESSEMER STEEL INGOTS AND RAILS IN 1902.

The American Iron and Steel Association has gathered the statistics of the production of Bessemer steel in the United States in 1902, also of Bessemer steel rails by the producers of Bessemer steel ingots. From the current issue of the *Bulletin* we reproduce below these statistics and the comments thereon:

Neither the production of Bessemer ingots nor the production of Bessemer rails kept pace in 1902 with the marvelous growth in that year of our iron and steel industries taken as a whole, which was owing entirely to the fact that the Lackawanna Iron & Steel Co. dismantled its Bessemer plants and its rail mills, as well as its remaining blast furnace, at Scranton, early in the year, preparatory to the erection at Buffalo by the Lackawanna Steel Co. of new and more extensive works, which are not yet entirely completed. The North Works of the company at Scranton made their last rails on Jan. 16, 1902, and the South Works made their last rails on Feb. 26.

Ingots and Castings.

The total production of Bessemer steel ingots and castings in 1902 was 9,306,471 gross tons, against 8,713,302 tons in 1901, an increase of 593,169 tons, or 6.8 percent. The increase in 1901 over 1900 amounted to 2,028,532 tons, or over 30 percent. The production of 1902 was the largest in our history. The following table gives the production of Bessemer steel ingots and castings in the last six years. Of the production last year 10,466 tons were steel castings, against a production of 6,764 tons in 1901.

Years. Gross tons.	Bessemer ingots.	Years. Gross tons.	Bessemer ingots.
1897	5,475,315	1900	6,684,770
1898	6,609,017	1901	8,713,302
1899	7,586,354	1902	9,306,471

Below we give by States the production of Bessemer ingots and castings in the last four years.

States—Ingots.	1899. Gross tons.	1900. Gross tons.	1901. Gross tons.	1902. Gross tons.
Pennsylvania	3,968,779	3,488,731	4,293,439	4,379,516
Ohio	1,679,237	1,388,124	2,154,846	2,528,802
Illinois	1,211,246	1,115,571	1,324,217	1,443,614
Other States	727,092	692,344	940,800	954,539
Total	7,586,354	6,684,770	8,713,302	9,306,471

There were no Clapp-Griffiths works in operation in 1902 and only two Robert-Bessemer plants were active. Five Tropenas plants were at work, as compared with 7 in 1901. In addition one Bookwalter converter was running. All these works that were active were engaged in the production of steel castings only.

Rails.

The production of all kinds of Bessemer steel rails by the producers of Bessemer steel ingots in 1902 was 2,876,293 gross tons, against a similar production in 1901 of 2,836,273 tons, in 1900 of 2,361,921 tons, and in 1899 of 2,240,767 tons. The maximum production of Bessemer steel rails by the producers of Bessemer steel ingots was reached in 1902, but the increase in that year over 1901 amounted to only 40,020 tons, or 1.4 percent. As compared with 1887, fifteen years ago, the increase in 1902 in the production of Bessemer rails amounted to only 831,474 tons, or 40 percent, while during the same period the increase in the production of Bessemer ingots amounted to 6,370,438 tons, or almost 217 percent. The following table shows the production by states of Bessemer steel rails by the production of Bessemer steel ingots in the last four years. The figures do not include a small quantity of rails made each year from purchased blooms or from rerolled steel rails, statistics for both of which products for 1902 are not yet available.

States—Rails.	1899. Gross tons.	1900. Gross tons.	1901. Gross tons.	1902. Gross tons.
Pennsylvania	1,224,807	1,195,255	1,406,008	1,148,425
Other States	1,015,960	1,166,666	1,430,265	1,727,868
Total	2,240,767	2,361,921	2,836,273	2,876,293

At the request of the manufacturers we separated for 1897, for the first time, the production of rails weighing 45 pounds and less than 85 pounds to the yard from those weighing less than 45 pounds and over 85 pounds to the yard. This separation we continue for 1902 as follows. Bessemer rails made from purchased ingots or from rerolled rails are not included.

States—Rails.	Under 45 pounds. Gross tons.	45 pounds and less than 85. Gross tons.	85 pounds and over. Gross tons.	Total. Gross tons.
Pennsylvania	53,964	766,567	327,894	1,148,425
Other States	173,104	1,237,496	317,268	1,727,868
Total for 1902	227,068	2,004,063	645,162	2,876,293
Total for 1901	140,214	2,202,237	493,822	2,836,273
Total for 1900	154,796	1,605,067	602,058	2,361,921

It will be noticed that there was a considerable decline in 1901 in the production of Bessemer steel rails weighing 85 pounds and over as compared with 1900, but that in 1902 there was an increase over 1900 and a very large increase over 1901. The production of rails weighing between 45 and 85 pounds shows a slight decrease in 1902 as compared with 1901.

The total production of rails in 1902 will include rails made from open-hearth steel, rails rolled from purchased Bessemer blooms, rerolled rails, and iron rails. The total from all these sources in 1901 amounted to 38,366 tons.

With the exception of the Lackawanna plant at Scranton all our Bessemer rail mills were operated nearly to full capacity in 1902, the demand for steel rails being greater than the supply all through the year. In addition to our large production of rails we imported last year 63,522 tons of iron and steel rails, but to balance this importation we exported 67,666 tons of iron and steel rails. In 1901 we exported 318,956 tons of rails and imported only 1,905 tons. Virtually all our imports and exports of rails are steel rails.

Labor Status of the British Iron Trade.

The monthly memorandum sent out by the English Board of Trade covering the skilled labor market for January is as follows:

Pig-iron Industry.—Compared with December employment shows an improvement, and it is better than a year ago. The improvement, as compared with December, is due to the relighting of 11 furnaces in Scotland which had been stopped for repairs. In England and Wales there was little change. Returns relating to the works of 114 ironmasters show that 327 furnaces, employing about 22,600 workpeople, were in blast at the end of January, compared with 317 at the end of December last, and 321 a year ago.

Iron and Steel Manufacture.—Employment has fallen off somewhat as compared with December last, and is worse than a year ago. At 201 works covered by the returns, employing 73,589 workpeople in the week ended January 24, the total volume of employment (taking into account both the number employed and the number of shifts worked) shows a decrease of 2.8 percent compared with December, 1902, and of 5.5 percent compared with the corresponding period in 1902.

Tin Plate Manufacture.—Employment in this industry continues good. At the end of January, 392 mills were working, an increase of five compared with the end of December, and of two compared with the number at work a year ago. The number of workpeople employed at the mills in operation is estimated to be about 19,600.

Engineering Trades.—The general state of employment continued quiet in January, and was rather worse than a year ago. The percentage of unemployed members of trade unions was 5.6, as compared with 6.6 in December, and 5.2 percent in January, 1902.

Shipbuilding Trades.—Employment generally continued bad, and was much worse than a year ago. The percentage of unemployed union members for all districts was 12.9 at the end of January, as compared with 14.0 at the end of December, and 4.7 in January, 1902.

None of the motive plant of the J. I. Case Plow Works, Racine, Wis., was damaged by the recent fire and all departments except one were in operation the day after the fire. A new building to take the place of the one which was burned will be built next summer.

The Virginia Iron, Coal & Coke Co. has blown in its No. 2 furnace atMiddlesboro, Ky., which had not been in blast since last November.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of their Wants:—

The Harris Mfg. Co., recently organized at Greenville, S. C., will manufacture railway train signals, invented by B. S. H. Harris and W. A. Harris, of Greenville, which are now in use on several railway systems in the south. The company has acquired a building and will equip it for use within sixty days. The officers are: Wm. G. Sirrine, president; Thomas P. Cothran, vice president; F. F. Capers, secretary and treasurer.

The Southern Iron & Equipment Co., Atlanta, Ga., wants shaper, 24-inch stroke and 16-inch slotter.

The Seattle Iron & Steel Co., Seattle, Wash., has been organized under a very broad charter, which permits it to do any kind of iron and steel manufacturing. The authorized capital is $6,000,000. The company is reported to have taken over the blast furnace at Irondale, Wash., and to have obtained numerous options.

The Jefferson Iron & Steel Co., of Philadelphia, Pa., has been incorporated with a capital stock of $500,000.

H. D. Hampton, Batavia, N. Y., has purchased a building and will establish a machine shop. He will erect a small addition.

The G. H. Merritt Co., of New York City, has been incorporated with a capital of $2,000 to manufacture machinery. The directors are: S. H. Merritt and W. L. Merritt, of Sag Harbor, and Gardiner Merritt, of New York City.

The Howland-Sherman Mfg. Co., Baltimore, N. Y., has obtained permission to increase its capital stock from $250,000 to $300,000. The company manufactures machinery supplies.

The American File Co., Portland, Me., has been organized to manufacture files and other tools. It has a capital stock of $300,000 of which $600 is paid in.

S. D. Helm and other citizens of Crawfordsville, Ind., are organizing a stock company for the manufacture of metal corrugated culverts. The plant will be erected in Crawfordsville.

The Kreider Machine Co., Lancaster, Pa., has been incorporated with a capital of $10,000. The directors are: E. H. Kreider, I. H. Weaver, Ira H. Bare, Elmer J. Weaver, Kendig H. Bare, Dr. B. Frank Witmer.

The Mathews Edge Tool Co., Mathews, Ind., is being organized with a capital of $50,000. It is expected to have the machinery installed and the plant in operation within two months.

The North Falls Foundry Co., North Falls, Pa., has been incorporated with a capital of $25,000. The directors are: Frederick Sabin, Howard Miller and Samuel C. Wells.

The Northwest Steam Boiler Co., Des Moines, Ia., has been incorporated with a capital of $200,000.

The Johnson & Chapman Co., Chicago, capital $50,000, has been incorporated and will manufacture machinery, equipment and supplies.

The Detroit Equipment Co., Detroit, capital $10,000, has been incorporated to construct locomotives and railroad rolling stock.

Citizens of Ventura, Cal., have formed a company to purchase the Ventura Machine Shops now owned by Wm. Hamilton. The new organization has a capital of $25,000 and will equip the plant with the latest improved machinery.

The Whale Creek Iron Works, Brooklyn, N. Y., capital $10,000, has been incorporated.

James G. Wilson Mfg. Co., capital $500,000, has been incorporated at Norfolk, Va., and will erect a structural steel, iron and wood-work plant in that city.

The Herzler & Henniger Machine Works, of Belleville, Ill., have been incorporated with a capital of $21,000 to manufacture coal mining machinery and to do a general repairing of machinery.

The Hudson River Foundry Co., Poughkeepsie, N. Y., has been incorporated with a capital of $30,000.

The Dixon Machine Co., Dixon, Ill., capital $5,000, has been incorporated for the purpose of building and repairing machinery.

The Queen City Machine Tool Co., Cincinnati, capital $15,000, has been incorporated by Albert M. Watcher, Wm. H. Roch, Campbell J. McDearmid, M. T. Watts and Orris P. Cobb.

George Foundry & Machine Works, Rome, Ga., wants a 24-inch engine lathe, eight-foot bed, modern pattern; second-hand preferred.

Alvey-Ferguson Co., Louisville, Ky., will be in the market for punches to punch one-quarter inch hole to one-half inch in three-eighths inch steel; also shears for cutting flat steel and angles.

Binney & Smith Co., 81-83 Fulton street, New York, N. Y., will buy second-hand 80 to 100-horsepower automatic cutoff or Corliss engine, horizontal return flue tubular boiler about 50 horsepower, horizontal return flue tubular boiler about 80 horsepower.

The Domestic Engine Co. has been incorporated at Hagerstown, Md., with capital of $10,000, by Charles B. Segner, Harry R. Segner, W. Harry Reisner and others, for manufacture of gas engines and gasoline engines, etc.

The Wisconsin Foundry & Steel Works, Cedar Grove, Wis. has decided to enlarge the scope of its business and increase its capital from $25,000 to $50,000.

The Northwestern Steam Boiler Co., Duluth, has been incorporated with a capital of $200,000.

The Enterprise Machine Works, Nashville, Tenn., has been incorporated with a capital of $15,000.

The Tunnel City Bridge & Iron Works, Port Huron, Mich., has been incorporated with a capital of $10,000.

The Fort Wayne Arch & Culvert Co., Ft. Wayne, Ind., has been incorporated under the laws of West Virginia to contruct and sell steel centered concrete arches and culverts, pipes and conduits. The authorized capital stock is $20,000 and the stockholders are: Roy G. Lane and Louis Lane, of Toledo, O.; Wm. Geake, of Fort Wayne, Ind.; J. K. Campbell of Wauseon, O.; and C. C. Schlatter of Fort Wayne, Ind.

Clark Bros. & Co., manufacturers of bolts and nuts for thirty-two years at Milldale, Conn., have been incorporated as the Clark Bros. Bolt Co., with a capital of $100,000.

Fires and Accidents:—

The foundry of the Union Mining Co. near Cumberland, Md., of which ex-Gov. Lloyd Lowndes is president, was destroyed by fire March 1st. The loss if $15,000, partially covered by insurance.

The blade manufacturing department of the Coes Wrench Co., Worcester, Mass., was damaged by fire March 3rd. Loss $40,000, of which $35,000 is on finished blades and $5,000 on the building.

New Construction:

The plant which the Railway Supply Co., formerly of Harvey Ill., will build at Chicago Heights, Ill., will consist of a foundry 150x350 feet, machine shop 100x350 feet and an office building and patternhouse. The machine shop will have two twenty-ton electric traveling cranes and will be equipped throughout with modern machinery.

The Withington Fence Co. is erecting a plant 500x165 feet, two stories. The machine shop will be on the first floor.

The Turners Falls Machine Co., Turners Falls, Mass., has acquired the Clark Machine Shop of that city, and will build an additional shop in the spring. The contract for the new building has been let and the machinery ordered.

George B. Wyland will build a machine shop at Williamsport, Pa., at a cost of $5,000.

An addition will be built to the plant of the Variety Iron Works located at the corner of Hamilton St. and Case Ave., Cleveland. The building will be an iron structure 160x120 feet and will cost about $4,000.

The new buildings to be occupied by the American Nut & Bolt Co., Birmingham, Ala., are nearing completion, and will be finished in about one month. The new plant will have a capacity of about four times that of the present works.

The S. Morgan Smith Co., York, Pa., is erecting a pattern making building 154x50 feet. The new foundry of this company is nearly completed.

The new building being erected by the Detroit Foundry Co., Detroit, Mich., will be a steel frame structure 100x200 feet.

It will have a 10-ton traveling crane and several jib cranes. There will be two cupolas, one of 12-ton capacity and the other 6-ton.

The Whitney Car Wheel Works will erect a plant at Camden, N. J., at a cost of $10,000.

Frazer & Jones will build an addition to their foundry at Syracuse, N. Y., at a cost of $10,000.

The Laconia Car Co., Berlin, N. H., is building an addition to its malleable iron foundry which will cover 1,800 square feet, and will increase the capacity of that department over 20 percent.

The Atlanta Tin Plate Co., Atlanta, Ind., has progressed very rapidly with its new construction and has three buildings completed. The main building is 466 feet long.

The directors of the G. D. Colton Co., Galesburg, Ill., have completed arrangements for the rebuilding of the shop of the company at a cost of $12,000.

The Pennsylvania Railroad Co. has begun the erection at Altoona, Pa., of a building 90x500 feet, which will be used for the construction of steel cars.

The Baltimore & Ohio Railroad Co. will build a car shop and foundry at Halethorpe, or Curtis Bay, Maryland. The site has not yet been selected.

A site has been obtained by the Allen-Worden Structural Iron Works, Milwaukee, Wis., recently incorporated, and the plant will be built at a cost of $30,000.

The Galena Iron Works, Galena, Ill., have just installed new machinery at their plant, and in the spring will erect a foundry.

Extensive improvements are being made at the plant of the American Steel & Wire Co., at Anderson, Ind. Twelve boilers from the recently dismantled plant at Beaver Falls, Pa., will be taken to Anderson.

Extensive improvements are contemplated by the owners of the Southern Saw Works, East Point, Ga. President Boyd says that work will probably be begun at an early date and that the cost will be nearly $500,000.

The Hocking Valley Railroad will build shops at Fultonham, O. About fifty men will be employed.

The new plant of the Rockford Machine Works, Rockford, Ill., has been completed. The structure is 32x157 feet, with an ell 32x60 feet.

The Jewett Car Co., Newark, O., is making improvements in its plant in several different departments, doubling the capacity of the blacksmith shop and erecting new paint and erecting shops, also installing pneumatic air throughout, besides equipping the wood and iron departments with new machinery. The company has already contracted for a new boiler plant, laying rails throughout the lumber yards, and is constructing a modern and substantial steel transfer table.

The Sessions Foundry Co., Bristol, Conn., is building an addition, 50x60 feet. Material and equipment have been ordered.

The Alabama Tube & Iron Co., Frank L. Clark, president, Birmingham, Ala., will enlarge its plant at Helena, Ala., and increase the output of its ore mines in Shelby county.

The Chattanooga Roofing & Foundry Co. has commenced erection of an addition, which will be 50x100 feet, and have brick and stone foundation, with sheet-iron sides and roof, to be equipped with machinery for manufacture of new articles.

The Akron Brass Co., Akron, O., recently incorporated, will build a foundry and will move to that city the plant of the Albert L. Lambert Co., Cleveland. Brass specialties will be manufactured. Albert L. Lambert will be the general manager.

The Ray Automatic Machine Co., Cleveland, has decided to build its plant at Berea, O., about 15 miles from Cleveland, citizens of that town having subscribed $50,000, of which $32,000 was for bonds of the company and the rest cash. The main building will be 45x150 feet, two or three stories. The company will manufacture nuts, bolts and parts for automobiles. The Ray nut tapping machine has been described in this paper.

The American Mfg. & Novelty Co., Erie, Pa., whose plant was recently destroyed by fire, will build at once, a 60 horsepower plant, with two story building having 15,000 square feet of floor space.

The Chattanooga Machinery Co., Chattanooga, Tenn., will erect a machine shop adjoining its foundry at a cost of $30,000.

The Alvey-Ferguson Co., Louisville, Ky., manufacturer of conveyors, skids, trucks and other labor-saving devices, will erect a new plant, consisting of two brick buildings and boiler house 100x40 feet each; will use electricity for distributing power—direct connected dynamo.

Work has begun on a large brick addition to the plant of the Williams Foundry & Machine Co., Akron, O. It will give double the present capacity of the shops.

The National Fire Brick Co. is enlarging its plant at Strasburg, O., to a daily output of 350 tons of fire clay materials. The company has found it necessary to develop coal properties of its own and has lately installed the largest steam shovel ever built by the Marion Steam Shovel Co., weighing 107 tons, to strip its land and dig both fire clay and coal. The product is sold in the middle of the year, the one handicap being the inability of the railroad company to furnish cars.

The Pittsburg District:—

The J. S. McCormick Co., Pittsburg, dealer in foundry supplies and equipment has received an order from the United States Government for the installation at the Watertown Arsenal, Watertown, Mass., one 10-ton McCormick Colliau cupola, one 12-ton worm-geared ladle and a complete lining for the cupola. Demand for all kinds of foundry supplies and equipment is reported excellent.

Colin McInnes, formerly superintendent of the Anchor Engineering & Machine Co., Pittsburg, has accepted a position with James Bonar & Co., Inc., steam specialty manufacturer, as superintendent of the new machine shop and brass foundry now in course of construction.

A section of the American Chemical Society was organized in Pittsburg last week with A. G. McKenna, chairman; J. M. Camp, vice-chairman; Dr. F. C. Phillips, councillor; H. C. Beggs, treasurer; and G. P. Maury, secretary. Despite the fact that the Pittsburg district contains probably more chemists than any other territory in the country no local section of the national society has ever existed there. The next meeting of the Pittsburg section will be held on March 19, at the rooms of the Engineers' Society of Western Pennsylvania. All chemists desiring to become affiliated with this organization are requested to attend.

The first meeting of the mechanical section of the Engineers' Society of Western Pennsylvania was held at Pittsburg, on Tuesday evening, March 3. The subject for discussion was "Mechanical Stokers."

Contracts for fully $70,000 worth of machinery for installation in the new McKees Rocks, Pa., shops of the Pittsburg & Lake Erie railroad were awarded this week. Manning, Maxwell & Moore were awarded the bulk of the orders for the new machinery, to be manufactured by Hilles & Jones of Wilmington, Del., and the Putnam Machine Co., Worcester, Mass.

The machine shop of the Iron City Tool Works, Pittsburg, was entirely destroyed by fire last week; loss, $20,000. The company made a specialty of small tools and mining equipment. As soon as matters can be adjusted plans will be drawn up for the rebuilding of the plant.

The Pennsylvania Air Brake Co. has been organized at Washington, Pa., for the manufacture of a new brake for which patents have just been granted. H. G. Manning of Washington is president of the new company.

General Industrial Notes:—

The Virginia Iron, Coal & Coke Co. has sold its iron furnace at Buena Vista, Va., and has leased its furnaces at Johnson City, Tenn., and Graham, Va. This is understood to be in keeping with the present policy of the company to dispose of some of its scattered interests and to concentrate as much as possible. The Toms Creek section is being given special attention. The Buena Vista furnace was sold to the Alleghany Ore & Iron Co.

Milliken Brothers, of 11 Broadway, N. Y., have secured a contract for the structural material for twelve buildings to be erected in the Norwegian ore properties of the Dunderland Iron Co., which was incorporated in London last year for the purpose of treating ore by the Edison concentration process, for shipment to England.

The Sanders-Mason Pneumatic Spring Co., Dalton, Ga., recently incorporated, does not expect to manufacture pneumatic springs, but to interest different vehicle manufacturers to use the springs on their vehicles. It is the intention by the use of this pneumatic spring to replace rubber tires at a less cost.

The Buckeye Steam Fitting Co., Cleveland, has been succeeded by the Buckeye Heating & Supply Co., which will carry on the business and add a line of steam users' goods.

The Coleman foundry, New Orleans, will hereafter be operated by Chas. Bedell as structural and ornamental iron works.

The annual meeting of the stockholders of the Solid Steel Casting Co., of Chester, Pa., was held recently. The directors elected for the ensuing year were: Fred W. Wood, Richard Peters, E. C. Felton, Felton Bent, P. J. McEntee, J. J. Burleigh and Luther S. Bent. The officers of the company are: President, Felton Bent; secretary and treasurer, Richard Peters, Jr.; superintendent, P. J. McEntee; assistant superintendent, J. F. Coale. R. C. Appleby is sales agent for the company

The Reliance Gauge Column Co., Cleveland, has received orders for a considerable number of Reliance columns from the B. R. Rowland Co., of Birmingham, Eng., which has adopted the Reliance columns on the boilers which it manufactures. Orders have also recently been received for columns to go to South Africa and Japan.

The entire capital stock of the Massey Iron Co., Kansas City, Mo., is now owed by Chas. E. Faeth, of Sioux City, Iowa, and Nicols, Dean & Gregg, of St. Paul, Minn. The company does a manufacturing, jobbing and importing business and intends to largely increase its stock to meet the demands of the territory tributary to Kansas City.

At a special meeting of the stockholders of the Lackawanna Steel Co., held in Buffalo, March 3, the $15,000,000 bond issue recently decided on by the board of directors was authorized unanimously.

The Playford Stoker Co., Cleveland, has retired from business, having sold its patents and good will to the Rosedale Foundry Co., Allegheny, Pa.

The Auburn Foundry Co., Auburn, Me., has been sold to G. W. McFadden, who will hereafter operate it.

The mills of the Republic Iron & Steel Co., at Muncie, Ind., which had been idle for several weeks on account of the deficient gas supply, have resumed. New pumping engines have been installed. The company is confident that hereafter there will be an abundant supply of gas.

The Canadian Tin Plate Co., London, Ont., recently incorporated, has elected the following officers: President, J. W. Thompson; vice president, J. T. Tilley; secretary, J. T. Thompson; manager, A. E. Donovan.

L. E. Hinkley of the Millersburg Foundry & Machine Works, Millersburg, O., has closed a contract with the C. A. & C. Railroad Co. to furnish it with all castings used at the Mt. Vernon shops of that railroad.

The Norfolk & Western Railroad will hereafter use its machine shops at Roanoke, Va., for construction work, and the new shops at Portsmouth, O., will be used for repair work.

The Twin City Iron Works will remove its machine shop and foundry April 1st from Hurley, Wis., to Ironwood, Mich. Excessive taxation is given as the main reason for removal from Wisconsin.

Robert Brooks has purchased the Huebner interest in the Brooks & Huebner Boiler Works at Duluth, Minn., and hereafter the concern will be called the Superior Boiler Works.

Hyle Brothers' Steel Works, Syracuse, N. Y., have been sold to a syndicate of New York men, and will hereafter be known as the Hyle Brothers' Steel Tool Co. Capital will be $1,000,000.

The Angle Steel Sled Co., Kalamazoo, Mich., will probably be moved to Otsego, Mich., in the spring. Geo. E. Bardeen, president of the company, is a resident of Otsego.

Judge Newman, sitting on the bench at Atlanta, Ga., has refused to appoint a receiver for the Tallapoosa Furnace Co., as petitioned by Harold L. Cheney and Chester Baird of Philadelphia. Judge Newman required, however, that the company give bond in the sum of $20,000, and B. H. Hill of Atlanta was appointed referee to make an investigation of its affairs.

The Blue Mountain Iron Works, Baker City, Ore., has been sold to A. J. Schumaker of Butte, Mont., for $29,250. It is understood that the new owner will add new machinery and improve the plant in other ways.

The strike of machinists at the Duluth, Missabe & Northern Machine shop at Proctorknott, Minn., has been settled and the men have resumed work on the former scale, $3.25 per day.

John R. Sayler, owner of machine shops at Pottstown, Pa., has purchased the Milligan foundry plant, and will operate it in connection with his machine works.

Robert K. Wehner of Newark, N. J., and John J. Townsend of New York City have been appointed temporary receivers of the Isabell-Porter Co., a New York corporation with a plant at Newark, N. J., where machinery for refrigerator and ice-making plants is manufactured.

The Business Men's Association of Pana, Ill., and the Illinois Skein & Nut Lock Co., of St. Louis, have made a contract whereby the company will locate a manufacturing plant in Pana.

The Southern Car & Foundry Co. has leased the plant of the Hercules Iron & Steel Co., Anniston, Ala., and placed it in operation. The company will use the plant for making castings used in the manufacture of cars.

The Rick Foundry, Reading, Pa., which had been idle for a number of years, resumed operation a few days ago.

The second annual meeting of the United States Steel Corporation will be held at Hoboken, N. J., April 20th. The stockholders will be asked to vote on the following matters: Ratification of the purchase of the stock of the Union Steel Co., ratification of the plans of the board of directors to spend $36,000,000 for improvements, and approval of the purchase of the Troy Steel Co. Eight directors will be elected to serve for three years. The directors whose terms expire are: Francis H. Peabody, Charles Steele, W. H. Moore, Norman B. Ream, P. A. B. Widener, J. N. Reed, Henry C. Frick and W. Edenborn. Probably no changes will be made in the personnel of the board.

The Ohio Rolling Mill property at Findlay, O., is being repaired and the plant will soon be in operation again. The company went into the hands of the receiver some time ago, and will now be operated by a number of the creditors.

W. R. Sawyer, formerly lessee of the Cleveland Gear Works, has equipped a gear cutting plant at 227 St. Clair street, Cleveland. The equipment is new and up to date in every particular. All kinds of gears, from large, heavy steel of coarse pitch to light brass experimental work, will be turned out.

The Roanoke furnace of the West End Furnace Co., Roanoke, Va., which was remodeled and resumed operations about a month ago after a number of years of idleness, is now reported to be making excellent iron of all grades with an output of 125 tons per day.

The Woodstock Iron Works at Anniston, Ala., blew out the old furnace for re-lining March 4, and are now running the new stack only.

The Hill Tool Co., Anderson Ind., started Monday working night and day manufacturing its tool holders. The company will soon be established in its new plant.

The J. A. & D. P. Cooper Co., of Struthers, O., manufacturer of carriage gear woods and ironed parts, has purchased the ironed gear department of the business of Andrew Kimble, Zanesville, O., and will add it to the large plant at Struthers.

The Chase Rolling Mill Co., Waterbury, Conn., whose recent increase of capital from $800,000 to $1,200,000 has been noted in these columns, made the increase to meet the demands of its business. It has no plans for building or adding equipment.

The Cleveland Gear Works, Cleveland, which was for five years operated by a lessee, will hereafter be managed by the proprietor, George B. Grant, with N. A. Fitch as superintendent. Mr. Fitch has been in the employ of the Grant Gear Works, Boston, for a number of years. The plant is being greatly improved.